BLM

DRAFT Resource Management Plan and Environmental Impact Statement for the Lander Field Office Planning Area

Volume 2 of 3
Chapters 4 - 6

September 2011

Wyoming Wind River Bighorn Basin District – Lander Field Office

The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

BLM/WY/PL-11/047+1610
Volume 2 of 3

Draft Resource Management Plan and Environmental Impact Statement

for the

Lander Field Office Planning Area

Volume 2 of 3

Chapters 4 - 6

U.S. Department of the Interior
Bureau of Land Management
Lander Field Office, Wyoming

September 2011

Table of Contents

VOLUME 2 OF 3

4. Environmental Consequences 535

4.1. Physical Resources 539
  4.1.1. Air Quality 539
    4.1.1.1. Summary of Impacts 539
    4.1.1.2. Methods and Assumptions 542
    4.1.1.3. Detailed Analysis of Alternatives 544
  4.1.2. Geologic Resources 575
  4.1.3. Soil 575
    4.1.3.1. Summary of Impacts 576
    4.1.3.2. Methods and Assumptions 576
    4.1.3.3. Detailed Analysis of Alternatives 579
  4.1.4. Water 593
    4.1.4.1. Summary of Impacts 596
    4.1.4.2. Methods and Assumptions 596
    4.1.4.3. Detailed Analysis of Alternatives 598
  4.1.5. Cave and Karst Resources 611
  4.1.6. Lands with Wilderness Characteristics 611
    4.1.6.1. Summary of Impacts 611
    4.1.6.2. Methods and Assumptions 612
    4.1.6.3. Detailed Analysis of Alternatives 612
4.2. Mineral Resources 617
  4.2.1. Locatable Minerals 617
    4.2.1.1. Summary of Impacts 617
    4.2.1.2. Methods and Assumptions 620
    4.2.1.3. Detailed Analysis of Alternatives 622
  4.2.2. Leasable Minerals – Coal 632
  4.2.3. Leasable Minerals – Geothermal 633
    4.2.3.1. Summary of Impacts 633
    4.2.3.2. Methods and Assumptions 633
    4.2.3.3. Detailed Analysis of Alternatives 634
  4.2.4. Leasable Minerals – Oil and Gas 635
    4.2.4.1. Summary of Impacts 636
    4.2.4.2. Methods and Assumptions 637
    4.2.4.3. Detailed Analysis of Alternatives 639
  4.2.5. Leasable Minerals – Oil Shale 658
  4.2.6. Leasable Minerals – Other Solid Leasable Minerals 658
    4.2.6.1. Summary of Impacts 658
    4.2.6.2. Methods and Assumptions 659

4.2.6.3. Detailed Analysis of Alternatives 661
4.2.7. Salable Minerals 669
4.2.7.1. Summary of Impacts 669
4.2.7.2. Methods and Assumptions 670
4.2.7.3. Detailed Analysis of Alternatives 672
4.3. Fire and Fuels Management 682
4.3.1. Unplanned/Wildfire 683
4.3.1.1. Summary of Impacts 683
4.3.1.2. Methods and Assumptions 683
4.3.1.3. Detailed Analysis of Alternatives 684
4.3.2. Planned/Prescribed Fires and Other Fuels Treatments 695
4.3.2.1. Summary of Impacts 695
4.3.2.2. Methods and Assumptions 695
4.3.2.3. Detailed Analysis of Alternatives 695
4.3.3. Stabilization and Rehabilitation 705
4.4. Biological Resources 706
4.4.1. Vegetation – Forests, Woodlands, and Aspen Communities 706
4.4.1.1. Summary of Impacts 706
4.4.1.2. Methods and Assumptions 707
4.4.1.3. Detailed Analysis of Alternatives 708
4.4.2. Vegetation – Grassland and Shrubland Communities 722
4.4.2.1. Summary of Impacts 722
4.4.2.2. Methods and Assumptions 723
4.4.2.3. Detailed Analysis of Alternatives 725
4.4.3. Invasive Species and Pest Management 739
4.4.3.1. Summary of Impacts 739
4.4.3.2. Methods and Assumptions 739
4.4.3.3. Detailed Analysis of Alternatives 740
4.4.4. Riparian-Wetland Resources 757
4.4.4.1. Summary of Impacts 758
4.4.4.2. Methods and Assumptions 758
4.4.4.3. Detailed Analysis of Alternatives 759
4.4.5. Fish and Wildlife Resources – Fish 774
4.4.5.1. Summary of Impacts 774
4.4.5.2. Methods and Assumptions 774
4.4.5.3. Detailed Analysis of Alternatives 775
4.4.6. Fish and Wildlife Resources – Wildlife 788
4.4.6.1. Summary of Impacts 788
4.4.6.2. Methods and Assumptions 789
4.4.6.3. Detailed Analysis of Alternatives 790
4.4.7. Special Status Species – Plants 838
4.4.7.1. Summary of Impacts 839
4.4.7.2. Methods and Assumptions 839
4.4.7.3. Detailed Analysis of Alternatives 840

4.4.8. Special Status Species – Fish 854
  4.4.8.1. Summary of Impacts 854
  4.4.8.2. Methods and Assumptions 855
  4.4.8.3. Detailed Analysis of Alternatives 856
4.4.9. Special Status Species – Wildlife 859
  4.4.9.1. Summary of Impacts 860
  4.4.9.2. Methods and Assumptions 860
  4.4.9.3. Detailed Analysis of Alternatives 861
4.4.10. Wild Horses 907
  4.4.10.1. Summary of Impacts 908
  4.4.10.2. Methods and Assumptions 908
  4.4.10.3. Detailed Analysis of Alternatives 908
4.5. Heritage and Visual Resources 928
4.5.1. Cultural Resources 928
  4.5.1.1. Summary of Impacts 929
  4.5.1.2. Methods and Assumptions 929
  4.5.1.3. Detailed Analysis of Alternatives 930
4.5.2. Paleontological Resources 941
  4.5.2.1. Summary of Impacts 942
  4.5.2.2. Methods and Assumptions 942
  4.5.2.3. Detailed Analysis of Alternatives 942
4.5.3. Visual Resources 949
  4.5.3.1. Summary of Impacts 949
  4.5.3.2. Methods and Assumptions 951
  4.5.3.3. Detailed Analysis of Alternatives 952
4.6. Land Resources 957
4.6.1. Lands and Realty 957
  4.6.1.1. Summary of Impacts 958
  4.6.1.2. Methods and Assumptions 959
4.6.2. Renewable Energy 960
  4.6.2.1. Summary of Impacts 961
  4.6.2.2. Methods and Assumptions 961
  4.6.2.3. Detailed Analysis of Alternatives 962
4.6.3. Rights-of-Way and Corridors 971
  4.6.3.1. Summary of Impacts 971
  4.6.3.2. Methods and Assumptions 971
  4.6.3.3. Detailed Analysis of Alternatives 972
4.6.4. Comprehensive Trails and Travel Management 981
  4.6.4.1. Summary of Impacts 982
  4.6.4.2. Methods and Assumptions 983
  4.6.4.3. Detailed Analysis of Alternatives 985
4.6.5. Livestock Grazing Management 994
  4.6.5.1. Summary of Impacts 994
  4.6.5.2. Methods and Assumptions 995

4.6.5.3. Detailed Analysis of Alternatives 996
4.6.6. Recreation 1019
4.6.6.1. Summary of Impacts 1020
4.6.6.2. Methods and Assumptions 1022
4.6.6.3. Detailed Analysis of Alternatives 1023
4.7. Special Designations 1035
4.7.1. Congressionally Designated Trails – Cultural and Historic Resources 1035
4.7.1.1. Summary of Impacts 1036
4.7.1.2. Methods and Assumptions 1036
4.7.1.3. Detailed Analysis of Alternatives 1037
4.7.2. Congressionally Designated Trails – Recreation and Visual Resources 1047
4.7.2.1. Summary of Impacts 1047
4.7.2.2. Methods and Assumptions 1048
4.7.2.3. Detailed Analysis of Alternatives 1049
4.7.3. Wilderness Study Areas 1054
4.7.3.1. Summary of Impacts 1054
4.7.3.2. Methods and Assumptions 1054
4.7.3.3. Detailed Analysis of Alternatives 1054
4.7.4. Wild and Scenic Rivers 1057
4.7.4.1. Summary of Impacts 1057
4.7.4.2. Methods and Assumptions 1057
4.7.4.3. Detailed Analysis of Alternatives 1059
4.7.5. Areas of Critical Environmental Concern 1064
4.7.5.1. Summary of Impacts 1065
4.7.5.2. Methods and Assumptions 1065
4.7.5.3. Detailed Analysis of Alternatives 1066
4.8. Socioeconomic Resources 1168
4.8.1. Social Conditions 1168
4.8.1.1. Summary of Impacts 1168
4.8.1.2. Methods and Assumptions 1169
4.8.1.3. Detailed Analysis of Alternatives 1170
4.8.2. Economic Conditions 1179
4.8.2.1. Summary of Impacts 1180
4.8.2.2. Methods and Assumptions 1181
4.8.2.3. Detailed Analysis of Alternatives 1183
4.8.3. Health and Safety 1189
4.8.3.1. Summary of Impacts 1190
4.8.3.2. Methods and Assumptions 1190
4.8.3.3. Detailed Analysis of Alternatives 1191
4.8.4. Environmental Justice 1192
4.8.4.1. Summary of Impacts 1192
4.8.4.2. Methods and Assumptions 1192
4.8.4.3. Detailed Analysis of Alternatives 1193
4.8.5. Tribal Treaty Rights 1193

4.9. Climate Change 1194
4.9.1. Summary of Impacts 1194
4.9.2. Methods and Assumptions 1194
4.9.3. Detailed Analysis of Alternatives 1197
4.9.3.1. Impacts Common to All Alternatives 1197
4.9.3.2. Alternative A 1199
4.9.3.3. Alternative B 1199
4.9.3.4. Alternative C 1200
4.9.3.5. Alternative D 1201
4.10. Cumulative Impacts 1202
4.10.1. Cumulative Impacts to Greater Sage-Grouse from Management Actions 1208
4.10.2. Cumulative Impacts to Air Quality with regard to Public Health and Welfare from Management Actions 1220
4.10.3. Cumulative Impacts to Water from Management Actions 1223
4.10.4. Cumulative Impacts to Riparian-Wetland Areas from Management Actions 1231
4.10.5. Cumulative Impacts to Vegetative Communities from Surface-Disturbing Activities and Other Management Actions 1237
4.10.6. Cumulative Impacts to the Continental Divide National Scenic Trail from Development Activities 1242
4.10.7. Cumulative Impacts to National Historic Trails from Development Activities 1246
4.11. Irreversible and Irretrievable Commitment of Resources 1256
4.12. Unavoidable Adverse Impacts 1257

5. Public Involvement, Consultation, and Coordination 1259

5.1. Introduction 1261
5.2. Public Involvement 1262
5.2.1. Scoping Period 1262
5.2.2. Public Notification of Scoping 1262
5.2.3. Scoping Meetings 1263
5.2.4. Open Houses/Public Meetings 1263
5.2.5. Future Public Involvement 1264
5.3. Consultation and Coordination 1265
5.3.1. Cooperating Agencies 1265
5.3.2. Section 7 Consultation 1266
5.3.3. Native American Interests 1267
5.4. Distribution List 1267
5.5. Consultation Letters 1272
5.6. List of Preparers 1283

6. References 1285

List of Figures

Figure 4.1. Estimated Annual Emissions by Alternative from BLM Activities in the Lander Planning Area, 2018 540
Figure 4.2. Estimated Annual Emissions by Alternative from BLM Activities in the Lander Planning Area, 2027 541
Figure 4.3. Contribution of Each Category to Total PM_{10} Emissions under Alternative A, 2018 553
Figure 4.4. Contribution of Each Category to Total NO_x Emissions under Alternative A, 2018 554
Figure 4.5. Contribution of Each Category to Total VOCs Emissions under Alternative A, 2018 555
Figure 4.6. Contribution of Each Category to Total HAPs Emissions under Alternative, A 2018 556
Figure 4.7. Contribution of Each Category to Total CO Emissions under Alternative B, 2018 561
Figure 4.8. Contribution of Each Category to Total SO_2 Emissions under Alternative B, 2018 562
Figure 4.9. Contribution of Each Category to Total PM_{10} Emissions under Alternative C, 2018 567
Figure 4.10. Contribution of Each Category to Total $PM_{2.5}$ Emissions under Alternative C, 2018 568
Figure 4.11. Contribution of Oil and Gas Development Emissions to Total Emissions by Alternative, 2018 573
Figure 4.12. Contribution of Non-Oil and Gas Mineral Development Emissions to Total Emissions by Alternative, 2018 574
Figure 4.13. Fremont County Subdivisions, 1985-2010 1227
Figure 4.14. Acres under Subdivision Development in Fremont County, 1985-2010 1227

List of Tables

Table 4.1. Estimated Annual Emissions Summary for BLM Activities in the Lander Planning Area 540
Table 4.2 Estimated Annual Greenhouse Gas Emissions (tons per year) Summary for BLM Activities in the Lander Planning Area 545
Table 4.3. Lander Planning Area GHG Emissions as Percentage of Wyoming Statewide GHG Emissions 546
Table 4.4. Estimated Annual Emissions by Activity – Base Year 2008 548
Table 4.5. Estimated Emissions by Activity (tons per year) under Alternative A, 2018 551
Table 4.6. Estimated Emissions by Activity (tons per year) under Alternative A, 2027 552
Table 4.7. Estimated Annual Emissions by Activity (tons per year) under Alternative B, 2018 558
Table 4.8. Estimated Annual Emissions by Activity (tons per year) under Alternative B, 2027 560
Table 4.9. Estimated Annual Emissions by Activity (tons per year) under Alternative C, 2018 564
Table 4.10. Estimated Annual Emissions by Activity (tons per year) under Alternative C, 2027 566
Table 4.11. Estimated Annual Emissions by Activity (tons per year) under Alternative D, 2018 570
Table 4.12. Estimated Annual Emissions by Activity (tons per year) under Alternative D, 2027 572
Table 4.13. Acres of the Planning Area Managed to Protect Wilderness Characteristics 611
Table 4.14. Acres of Subsurface Mineral Estate Closed to Locatable Minerals (Segregation and Withdrawals) 619
Table 4.15. Acreage of Withdrawals for the Benefit of Habitat, Cultural or Recreational Values 624
Table 4.16. Areas and Acreage Closed to Motorized Travel 624
Table 4.17. Acres of Mineral Estate Open, Open with Constraints, and Closed to Geothermal Leasing . 635
Table 4.18. Total Acres of Federal Mineral Estate Open, Open with Constraints, and Closed to Oil and Gas Leasing by Alternative 641
Table 4.19. Phosphate Potential 659
Table 4.20. Existing and Proposed Areas of Critical Environmental Concern 670
Table 4.21. Visual Resources Inventory and Management Classes by Alternative 950
Table 4.22. VRM Class Designation of Sensitive and Unique Scenic Features in the Lander Planning Area By Alternative 951
Table 4.23. Acreage of Withdrawals in the Lander Planning Area 959
Table 4.24. Wind Power Classification 961
Table 4.25. Travel Designations by Alternative 982
Table 4.26. Areas Closed to Motorized Vehicles By Alternative 983
Table 4.27. Acres Designated for Over-Snow Travel 983
Table 4.28. Acres Designated for Mechanized (Bicycle) Travel 983
Table 4.29. Travel Management Focus under Alternative A 986
Table 4.30. Travel Management Focus under Alternative B 988
Table 4.31. Travel Management Focus under Alternative C 991
Table 4.32. Estimated Reduction in AUMs by Alternative 1000
Table 4.33. Impacts to Recreation Setting by Alternative 1020
Table 4.34. Acreage Available to Consumptive, Non-consumptive, Motorized, and Nonmotorized Recreation Activities 1021
Table 4.35. Recreation-Specific Beneficial Outcomes by Alternative 1021
Table 4.36. Wildlife-Dependent Recreation Acreage by Alternative 1022

Table 4.37. Energy-Related Impacts to Recreation Areas under Alternative A 1026
Table 4.38. Energy-Related Impacts to Recreation Areas under Alternative C 1031
Table 4.39. Energy-Related Impacts to Recreation Areas under Alternative D 1035
Table 4.40. Congressionally Designated Trail Recreation Areas Managed for Beneficial Outcomes 1047
Table 4.41. VRM Classes as Percent of Congressionally Designated Trails Landscape 1048
Table 4.42. Waterways Eligible for Inclusion in the National Wild and Scenic River System 1058
Table 4.43. Impacts to Eligible WSRs Under Alternative A from Resource Uses 1060
Table 4.44. Impacts to Eligible WSRs from Other Special Designation Management 1061
Table 4.45. Impacts to Eligible WSRs under Alternative C 1063
Table 4.46. Overall Impacts to Social Conditions by Alternative 1169
Table 4.47. Comparison of Projected Earnings and Employment 1181
Table 4.48. Average Annual Impacts on Earnings and Output, by Sector and Alternative for the Planning Area 1184
Table 4.49. Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area 1185
Table 4.50. Estimated Oil and Gas Tax Revenues by Alternative for the Planning Area 1186
Table 4.51. Cumulative Surface Disturbance from BLM and Non-BLM Reasonable Foreseeable Actions 1204
Table 4.52. Summary of Reasonably Foreseeable Future Actions 1206
Table 4.53. Percent Composition by Land Ownership of Greater Sage-Grouse Core Area and Non-Core Area 1210
Table 4.54. BLM Contribution to Cumulative Annual Statewide Emissions 1221
Table 4.55. Cumulative Annual Emissions Summary for BLM and Non-BLM Activities in the Lander Planning Area 1222
Table 4.56. Wyoming Basin CDNST Management Miles by BLM Field Office 1245
Table 4.57. Number of Miles of Wyoming Basin CDNST Projected to be Impacted by Human Intrusion and Resource Uses 1245
Table 4.58. High Potential Trail Segments in the General Assessment Area 1248
Table 4.59. High Potential Trail Segments in the Specific Assessment Area 1252
Table 5.1. Public Involvement, Coordination, and Consultation Events 1261
Table 5.2. List of Preparers 1283

Chapter 4. Environmental Consequences

Introduction

The following analyses addresses impacts from Bureau of Land Management (BLM) management of federal surface and federal minerals. In some locations, there are private or State of Wyoming lands near or intermingled with public lands and/or federal mineral estate. The BLM land use plan only covers federal lands and mineral estate and federal actions. There depiction of geographic areas which might include lands with other ownerships does not suggest or imply that federal management applies to those properties.

General Assumptions for Analysis

The methods and assumptions listed below, and for each resource in Chapter 4, are disclosed to provide a basis for the conclusions reached in environmental assessments. Assumptions common to all alternatives and all resources are listed below, whereas assumptions unique to specific resources and resource uses are listed under *Methods and Assumptions* in the appropriate resource section.

- All alternatives are implemented in compliance with standard practices, best management practices (BMPs) (Appendix H (p. 1431)), design features, guidelines for surface-disturbing activities, and mitigation guidelines (Appendix M (p. 1489)). In other words, the practices and guidelines included in Appendix H (p. 1431) and Appendix M (p. 1489) are considered a component of each alternative. Appendix M (p. 1489) lists standard practices used in the planning area to mitigate adverse impacts caused by surface-disturbing activities.

- Comparison of impacts among resources is intended to provide an impartial assessment to inform the decision maker and the public. The impact analysis does not imply or assign a value or numerical ranking to impacts. Actions resulting in adverse impacts to one resource may impart a beneficial impact to other resources.

- In general, adverse impacts described in this chapter are considered important if they result from or relate to the key planning issues described in Chapter 1 and the context or intensity of impacts suggest potential impacts to public health and safety; a potential for violating legal standards, laws, or protective status of resources; or potential impacts to unique resources.

- The comparison of individual alternatives is qualitative, relative to Alternative A (current management), and based on professional judgment and consideration of the context and intensity of allowable uses and management actions anticipated to impact resources and resource uses.

- Analysis of environmental consequences considers the extent of projected surface disturbance and associated development resulting from BLM actions.

- The analysis of impacts reflects the anticipated impacts of alternatives on individual resources; for example, the impact of invasive nonnative plant species on wildlife is described in the *Fish and Wildlife Resources – Wildlife* section — not in the *Invasive Species and Pest Management* section.

- The analysis of impacts focuses on the anticipated future incremental and meaningful impact of management actions and allowable uses proposed for each alternative. The impact of past and present actions is encompassed within the description of existing conditions in Chapter 3, Affected Environment.

- The definition of surface-disturbing activities used for analysis is provided in the *Glossary*. Surface disturbance typically is described in terms of the total acres of short- or long-term disturbance from BLM actions. Short-term impacts are defined as those impacts that are anticipated to begin and end within the first 5 years after the action is implemented. Long-term impacts are defined as lasting beyond 5 years to the end of or beyond the 20-year planning timeframe addressed in the Resource Management Plan (RMP). Appendix T (p. 1535) lists projected surface disturbance associated with individual reasonable foreseeable actions.

- Although not defined as a surface-disturbing activity, livestock and native ungulate grazing and off-highway vehicle (OHV) use may remove vegetation and expose the soil surface leading to increased erosion if use is unmanaged or heavy.

- Surface disturbances generally increase surface runoff due to an increase in impervious surface, changes in water routing, and loss of vegetation. Surface disturbances also can decrease recharge to aquifers by increases in impervious surface due to compaction, or by transporting water away from areas which have the capability to infiltrate.

- It is assumed that the greater the amount of surface disturbance in a watershed, the greater the probability that accelerated sedimentation associated with the excess surface runoff and will result.

- The Wyoming Standards for Healthy Rangelands (Appendix J (p. 1437)) set forth standards that apply to all activities.

- Planning decisions pursuant to the RMP also apply to BLM-administered federal minerals that underlie non-federal lands (split-estate).

- There are no RMP decisions made for non-federal land surface or mineral estate, on federal lands administered by other federal agencies, or on the federal mineral estate underlying federal lands administered by other federal agencies.

- Planning and management direction focuses on the relative values of resources and not exclusively on the greatest economic return or economic output.

- Reasonably foreseeable action or activity scenarios for all land and resource uses have been developed and portrayed based on historical, existing, and projected levels for all programs.

- Existing endangered species recovery plans, including plans for reintroduction of endangered species and other species, have been considered. Consultation, coordination, and cooperation with the United States Fish and Wildlife Service (USFWS) has occurred in accordance with the 2000 BLM/USFWS Interagency Memorandum of Understanding (MOU) regarding Section 7 Consultation (USFWS and BLM 2000). All existing biological assessments and biological opinions regarding areas within the planning area have been reviewed for applicability.

- Mitigation requirements exist that prevent or limit direct impacts associated with land use activities or that reclaim the land after the activity has been completed.

- Projections of the level of activity for land uses are based on historical trends, existing land use agreements such as leases or permits, and statements of interest in land use by individuals and industry organizations.
- Funding will be available to implement the alternatives described in Chapter 2.
- The decisions proposed in the alternatives apply to public lands only. However, cumulative impact analyses considered decisions made for resources managed by other entities or individuals.
- The alternatives will be implemented as described in Chapter 2.
- Appropriate maintenance will be carried out to maintain the functional capability of all developments (e.g., roads, fences, and other projects).
- Monitoring will be completed as indicated, along with any needed adjustments or revisions.

4.1. Physical Resources

4.1.1. Air Quality

Air resources in the planning area were evaluated to determine how future BLM actions could impact air quality. Actions that initiate or increase emissions of air pollutants can adversely impact air resources, including increased concentrations of air pollutants, decreased visibility, increased atmospheric deposition on soils and vegetation, and acidification of sensitive waterbodies. Actions that reduce or control emissions of air pollutants can be very effective at improving air quality and preventing air quality degradation. This section addresses the potential impacts of air pollutant emissions from specific activities authorized, allowed, or performed by the BLM in the planning area under each alternative.

4.1.1.1. Summary of Impacts

Emissions of air pollutants were estimated for several management actions and activities likely to occur under each alternative. Emissions were estimated for five criteria pollutants, volatile organic compounds (VOCs), Hazardous Air Pollutants (HAPs), and greenhouse gases (GHGs). A baseline year of 2008 was used to estimate actual emissions and two future years, a short-term year (2018) and a long-term year (2027), were used as the basis to project future emissions. Emissions of all analyzed pollutants are estimated to increase over baseline levels in the short term with a decreasing trend in emissions from the short term to the long term. Emissions increases are due in part to the projected increase in oil and gas development, mining, and other mineral development.

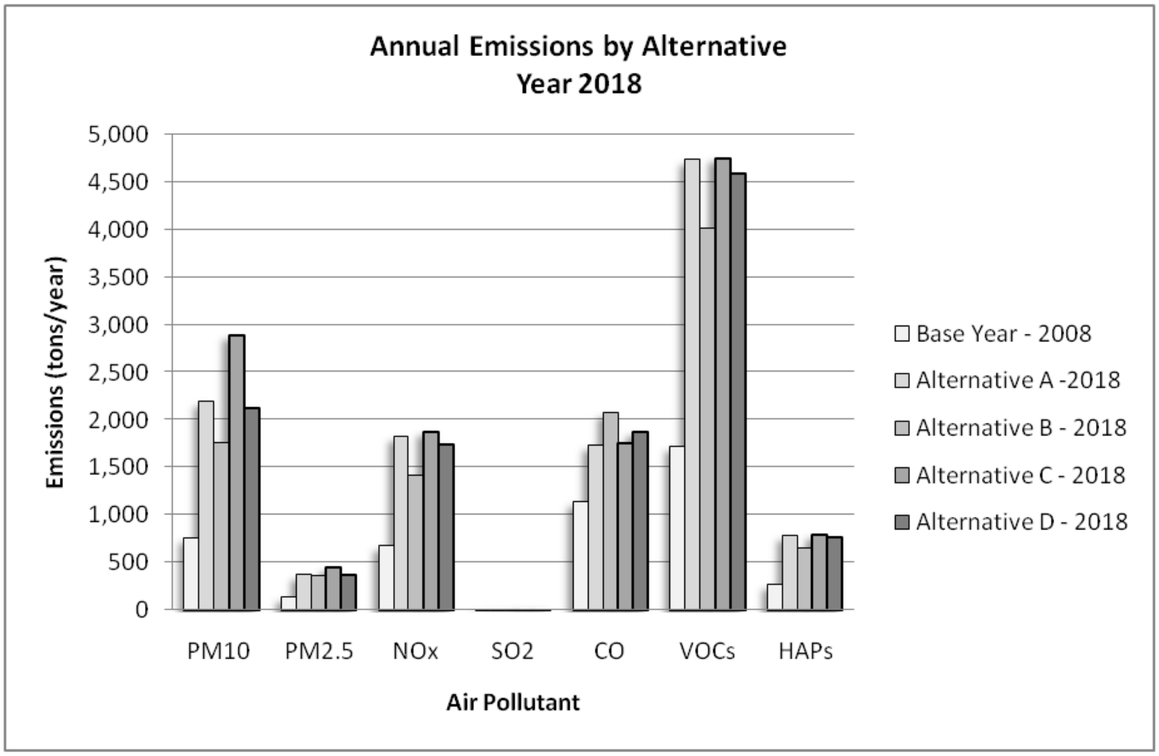
In general, Alternative B emissions estimates would result in the least increase in total air pollutant emissions. Lower emissions would be expected under this alternative because it is the alternative with the greatest restrictions on mineral development. Although total emissions increases are estimated to be the lowest under this alternative, carbon monoxide (CO) emissions could be highest under Alternative B and sulfur dioxide (SO_2) emissions could be the third highest under Alternative B. This is due primarily to the larger acreage of prescribed burning projected for Alternative B. This alternative would likely result in the least adverse impacts to air quality. Alternative C emissions estimates would result in the greatest increase in total air pollutant emissions. Alternative C imposes the fewest restrictions on minerals development, which would result in higher emissions than the other alternatives. Alternative C would have the highest potential to result in adverse impacts to air quality. Total emissions estimated under Alternative D (the Preferred Alternative) would result in the next-to-lowest increase in emissions over baseline. Table 4.1, “Estimated Annual Emissions Summary for BLM Activities in the Lander Planning Area” (p. 540) summarizes the estimated annual emissions under each alternative by pollutant. This same information is displayed graphically in Figure 4.1, “Estimated Annual Emissions by Alternative from BLM Activities in the Lander Planning Area, 2018” (p. 540) and Figure 4.2, “Estimated Annual Emissions by Alternative from BLM Activities in the Lander Planning Area, 2027” (p. 541).

Table 4.1. Estimated Annual Emissions Summary for BLM Activities in the Lander Planning Area

Scenario	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs
Base Year – 2008							
Base Year	761	135	678	11	1,138	1,726	270
Forecast Year – 2018							
Alternative A	2,195	371	1,829	23	1,734	4,737	786
Alternative B	1,760	359	1,420	24	2,077	4,019	654
Alternative C	2,887	443	1,873	25	1,758	4,754	788
Alternative D	2,122	373	1,747	24	1,872	4,592	759
Forecast Year – 2027							
Alternative A	2,047	344	1,528	22	1,583	3,722	616
Alternative B	1,621	335	1,173	23	1,953	3,145	509
Alternative C	2,737	416	1,546	24	1,596	3,734	617
Alternative D	1,976	347	1,458	23	1,727	3,606	594

Source: Appendix U (p. 1545)

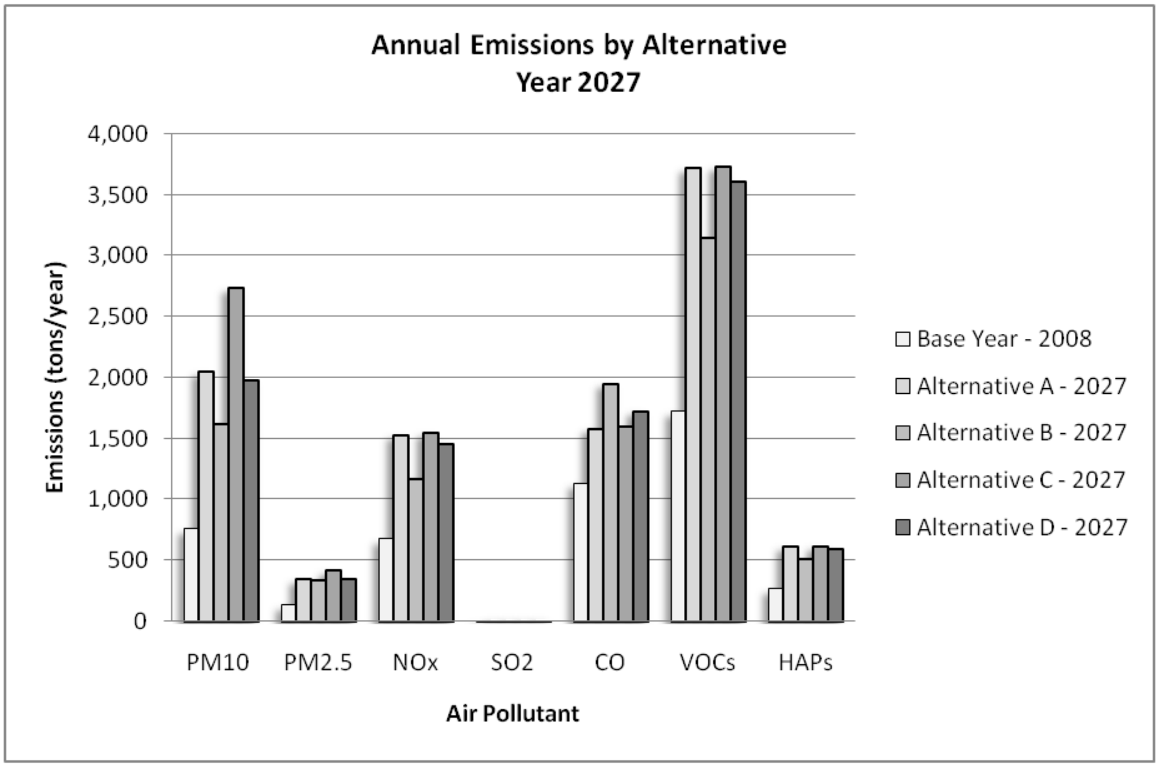
BLM Bureau of Land Management
CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
SO_2 sulfur dioxide
VOC volatile organic compound



Source: Appendix U (p. 1545)

BLM Bureau of Land Management
CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
SO_2 sulfur dioxide
VOC volatile organic compound

Figure 4.1. Estimated Annual Emissions by Alternative from BLM Activities in the Lander Planning Area, 2018



Source: Appendix U (p. 1545)

BLM Bureau of Land Management
CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
SO_2 sulfur dioxide
VOC volatile organic compound

Figure 4.2. Estimated Annual Emissions by Alternative from BLM Activities in the Lander Planning Area, 2027

4.1.1.2. Methods and Assumptions

The air resources impact analysis used an emissions-comparison approach, which involved the following steps:

- Identify management actions and activities of concern in the planning area that generate air pollutant emissions.
- Compile current (2008) operational and production data for each identified emission-generating activity.
- Compile projected future operational and production data for each identified emission-generating activity for the selected future project years (2018 and 2027).
- Calculate estimated current and projected future emissions of specific air pollutants for identified management actions and activities under each alternative.
- Analyze changes in estimated emissions over the baseline year and among alternatives.

The analysis focused on emissions associated with peak year construction activities and peak year production and operations emissions approximately 10 and 20 years from the baseline year. Year 2008 was chosen as the baseline year because this is the most recent year for which reliable data are available for estimating actual emissions. Project years 2018 and 2027 were selected for future-year scenarios because these years represent peak construction and operations years for projected oil and gas development. Management actions associated with oil and gas development represent the largest single sector of emissions for most of the air pollutants; therefore, peak development years for this sector were considered most conservative for calculating air emissions. Given uncertainties concerning the numbers, nature, and specific locations of future emissions sources and activities, the emissions-comparison approach provides an appropriate basis for determining potential impacts under each alternative. For a more detailed description of the methodologies and assumptions used in this analysis, refer to Appendix U (p. 1545).

The following air pollutants were identified as pollutants that could be emitted as a result of management actions and activities authorized, permitted, allowed, or performed under this RMP. Emissions of each of these pollutants were estimated for each identified activity and addressed for each alternative in this analysis.

- Carbon monoxide (CO)
- Nitrogen oxides (NO_x)
- Ozone (O_3)
- Particulate matter less than or equal to 10 microns in diameter (PM_{10})
- Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Volatile organic compounds (VOCs)
- Hazardous air pollutants (HAPs)

The following list of emissions-generating activities were identified as management actions and activities authorized, permitted, allowed, or performed under this RMP that could emit identified air pollutants and could adversely impact air quality in the planning area and Class I areas within 100 kilometers (approximately 60 miles) of the planning area. Emissions of air pollutants were estimated for the baseline year (2008) and projected for two future years (2018 and 2027) for each identified activity and addressed for each alternative in this analysis.

- Leasable Minerals – Conventional Oil and Gas Development
- Leasable Minerals – Coalbed Natural Gas (CBNG) Development
- Locatable Minerals – Bentonite Mining
- Locatable Minerals – Gold Mining
- Locatable Minerals – Uranium Mining
- Salable Minerals – Sand, Gravel, and other Mineral Development
- Fire and Fuels Management – Planned and Prescribed Fire
- Vegetation – Forests, Woodlands, and Aspen Communities Management
- Land Resources – Renewable Energy, Right-of-Way (ROW), and Corridor Projects
- Land Resources – Comprehensive Trails and Travel Management
- Land Resources – Livestock Grazing

Operations, production, and construction activity data used to estimate emissions for proposed emission sources were obtained from Lander Field Office personnel, the Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas for the Lander Field Office, the Mineral Occurrence and Development Potential Report, and from National Environmental Policy Act (NEPA) analyses underway for BLM actions in the planning area. Emissions factors used to estimate proposed emissions were obtained primarily from (1) the U.S. Environmental Protection Agency (EPA) AP-42 Compilation of Air Pollutant Emission Factors (EPA 1995a), (2) the EPA NONROAD2008a Emissions Model (EPA 2009c), (3) the EPA MOBILE6.2 Motor Vehicle Emission Factor Model (EPA 2006), (4) the American Petroleum Institute Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry

(American Petroleum Institute 2009), (5) the Wyoming Department of Environmental Quality (DEQ) – Air Quality Division, and (6) Western Governor's Association – Western Regional Air Partnership.

Methods and assumptions used in this impact analysis include the following:

- Air pollutant emissions are useful for comparing the relative impacts of each alternative and might not represent actual future emissions. Emissions estimates are based on predictions of future mineral resource development scenarios rather than actual development projects.
- Stationary sources associated with oil and gas development will operate in accordance with the Wyoming DEQ Oil and Gas Production Facilities Permitting Guidance, Chapter 6, Section 2, revised March 2010.
- Emissions from the following management actions were not estimated because the potential for development was considered low: coal mining, phosphate mining, oil shale development, geothermal development, and gemstones and other lapidary materials development.
- Emissions from the following management actions were not estimated because (1) the level of activity is not expected to change between alternatives, and (2) the magnitude of emissions from the activity is considered to be very small compared to other management activities, or (3) available operational or production data was not sufficient to quantify emissions: wildfires (unplanned), invasive species and pest management, grassland and shrubland management, wild-horse management, and activities related to heritage and visual resources, socioeconomic resources, and fish and wildlife resources.

4.1.1.3. Detailed Analysis of Alternatives

4.1.1.3.1. Impacts Common to All Alternatives for Greenhouse Gas Emissions

Concentrations of certain gases in Earth's atmosphere have been identified as being effective at trapping heat reflected off Earth's surface, thereby creating a "greenhouse effect." As concentrations of these GHGs increase, Earth's surface warms, the composition of the atmosphere changes, and global climate is affected. Concentrations of GHGs have increased dramatically in Earth's atmosphere in the past century. These increases, particularly in carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases have been attributed to man-made sources and human activities (EPA 2010a).

The EPA has determined that six GHGs are air pollutants and subject to regulation under the Clean Air Act (CAA): CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Of these GHGs, CO_2, CH_4, N_2O are commonly emitted by the types of activities included in this analysis, while the remaining three GHGs are emitted in extremely small quantities or are not at all. GHG emissions from management actions and activities were estimated for each alternative in this analysis for CO_2, CH_4, and N_2O.

As the major component of natural gas, CH_4 emissions from oil and gas exploration, production, and transportation can be considerable. Emissions of CO_2 and N_2O from fossil fuel combustion and fire can also be of concern. This analysis quantified emissions of CO_2, CH_4, and N_2O from the following management actions and activities for each alternative:

- Locatable Minerals – Bentonite Mining
- Locatable Minerals – Gold Mining
- Locatable Minerals – Uranium Mining
- Leasable Minerals – Conventional Oil and Gas Development

- Leasable Minerals – CBNG Development
- Salable Minerals – Sand, Gravel, and other Mineral Development
- Fire and Fuels Management – Planned and Prescribed Fire
- Vegetation – Forests, Woodlands, and Aspen Communities Management
- Land Resources – Renewable Energy, ROWs, and Corridor Projects
- Land Resources – Comprehensive Trails and Travel Management
- Land Resources – Livestock Grazing

Each GHG has been given a Global Warming Potential (GWP) number that accounts for the intensity of the substance's heat-trapping effect and its longevity in the atmosphere compared to CO_2. The EPA-recommended GWPs of 21 for CH_4 and 310 for N_2O were used in this analysis. The estimated quantity emitted for each GHG was multiplied by its GWP and summed with the other GHGs to obtain total GHGs emitted in CO_2 equivalents in short tons. CO_2 equivalents were then converted to million metric tons (MMt), the typical reporting unit for GHG emissions. Table 4.2, "Estimated Annual Greenhouse Gas Emissions (tons per year) Summary for BLM Activities in the Lander Planning Area" (p. 545) shows the estimated annual emissions of the GHGs under each alternative. Appendix U (p. 1545) includes additional details on the GHG emissions calculations.

Table 4.2. Estimated Annual Greenhouse Gas Emissions (tons per year) Summary for BLM Activities in the Lander Planning Area

Scenario	CO_2	CH_4	N_2O	CO_2 equivalents	CO_2 equivalents (million metric tons)
Base Year – 2008					
Base Year	169,265	8,619	3	351,311	0.33
Forecast Year – 2018					
Alternative A	559,075	32,651	7	1,246,816	1.17
Alternative B	416,330	20,561	10	851,295	0.81
Alternative C	571,776	33,210	7	1,271,258	1.19
Alternative D	530,540	30,946	8	1,182,822	1.11
Forecast Year – 2027					
Alternative A	463,202	26,699	6	1,025,689	0.96
Alternative B	339,404	16,070	10	679,856	0.64
Alternative C	475,621	27,242	6	1,049,511	0.98
Alternative D	438,381	25,276	7	971,142	0.91

Source: Appendix U (p. 1545)

BLM Bureau of Land Management
CO_2 carbon dioxide
CH_4 methane
N_2O nitrous oxide

GHG emissions are estimated to increase under all alternatives over estimated baseline emissions by almost 1½ under Alternative B and more than 2 times under alternatives A, C, and D. Alternative C shows the highest increases in GHG emissions due primarily to the higher projected oil and gas production activities under that alternative. Oil and gas production is the major contributor to GHG emissions under all alternatives. The largest sources of GHG emissions in the oil and gas sector are CO_2 emissions from natural gas compressors and drill rig engines, and fugitive CH_4 emissions from wellhead equipment, pneumatic devices, and tanks. Estimated GHG emissions are based on worst-case estimates of production rates and operational characteristics, and likely result in overestimated total GHG emissions. Considerable reductions in these estimated emissions might be realized at the time of actual development through control technologies such as electric compressor engines, “green completions,” low- or no-bleed pneumatic devices, and capture and control of leaks and vents.

Table 4.3, “Lander Planning Area GHG Emissions as Percentage of Wyoming Statewide GHG Emissions” (p. 546) compares project-related GHG emissions under each alternatives to a statewide inventory of GHG emissions completed in 2007. The inventory was compiled for the Wyoming DEQ by the Center for Climate Strategies and was based on actual emissions for 2005 and projected emissions for 2010 and 2020. GHG emissions estimated for each of the alternatives comprise approximately 2 percent of statewide GHG emissions. As another means of comparison, the total estimated GHG emissions for Alternative D are approximately equivalent to the CO_2 emissions from a 100 megawatt (MW) coal-fired power plant or approximately one-fifteenth the reported CO_2 emissions from the Jim Bridger Power Plant in Sweetwater County for 2009 (EPA 2009d). The total estimated GHG emissions under Alternative D of 1.11 MMt are approximately equal to 0.01 percent of the total U.S. 2008 GHG emissions of 6,956 MMt (EPA 2010b). Assessing the impacts of GHG emissions on global climate change requires modeling on a global scale, which is beyond the scope of this analysis. Potential impacts to climate change are influenced by GHG emission sources from around the globe and it is not possible to distinguish the impacts to global climate change from GHG emissions originating from the planning area.

Table 4.3. Lander Planning Area GHG Emissions as Percentage of Wyoming Statewide GHG Emissions

Lander Planning Area		Wyoming Statewide Inventory		Percent Contribution
Scenario	**Estimated GHG Emissions (MMt CO_2 equivalents)**	**Year**	**Estimated GHG Emissions (MMt CO_2 equivalents)**	**BLM GHGs to Wyoming GHGs**
Base Year - 2008	0.33	Actual Estimated 2005	55.6	0.60%
Alternative A - 2018	1.17	Projected 2020	69.4	1.69%
Alternative B - 2018	0.81	Projected 2020	69.4	1.16%
Alternative C - 2018	1.19	Projected 2020	69.4	1.72%
Alternative D - 2018	1.11	Projected 2020	69.4	1.60%

Source: Center for Climate Strategies 2007

BLM Bureau of Land Management
CO_2 carbon dioxide
GHG greenhouse gas
MMt million metric tons

4.1.1.3.2. Impacts Common to All Alternatives

Impacts to air quality include changes in air pollutant concentrations, changes in visibility, impacts to soils and vegetation from atmospheric deposition, and changes in lake chemistry. Several key factors play a role in determining the severity of these impacts, such as the magnitude and chemistry of the air emissions, meteorological conditions, and topography. Emissions were quantified for each of the alternatives as an indication of the potential magnitude of impacts to air quality under each alternative. All of the alternatives would result in changes to emissions of air pollutants in relation to the baseline year and would therefore result in impacts to air quality. For this analysis, the magnitude of the change in emissions was analyzed to determine if impacts to air quality have the potential to be significant (i.e., exceed the NAAQS [National Ambient Air Quality Standard] or exceed screening levels of concern for visibility and atmospheric deposition). Air dispersion modeling can be used to determine ambient concentrations of air pollutants and impacts to visibility; however, models depend on specific input data to predict impacts. These input data include actual meteorological data, actual emissions data, emissions source spatial and temporal data, and actual topographic data. At this stage of the planning process, these project-specific data are not available. Proponents of mineral development projects will be required to perform a NEPA analysis of the impacts of proposed projects to ambient air quality standards at the time projects are proposed. Such an analysis could require a dispersion modeling analysis that includes a demonstration of no adverse impacts in Class I areas.

Under all alternatives, oil and gas development is the single largest contributor to total air pollutant emissions compared to other management activities. Activities quantified in this category include well drilling and completion, road and well pad construction, flaring and venting, compressor operations, dehydrator and separator operations, tank venting and loadout, wellhead fugitives, pneumatic device operations, and vehicle traffic. The quantities of emissions estimated from these activities are based on reasonably foreseeable estimates of production rates, well counts, development rates, and existing technologies. The emissions numbers should not be considered definitive and might not reflect actual emissions at the time of development. Although the quantity of emissions calculated for this category might not represent actual emissions from eventual development, the magnitude of differences in emissions estimated for this source category compared to the other source categories is considerable. Emissions of NO_x and VOCs from this category have the potential to adversely impact air quality under each alternatives. These impacts could include increased ambient concentrations of O_3, decreases in visibility, adverse impacts to vegetation, and increased atmospheric deposition. Emissions of particulate matter from this category could increase ambient concentrations of particulate matter (fugitive dust), decrease visibility, and increase atmospheric deposition. Emissions of HAPs could result in a localized increased risk of adverse impacts to human health. The emissions estimated for CO under each alternative for this category could contribute to the formation of O_3. Estimated SO_2 emissions for this category under each alternative are minor and, although they could contribute to adverse impacts to visibility, it is unlikely that these emissions would result in a major adverse impact to air quality by increasing ambient concentrations of SO_2 above the NAAQS. For additional information on significance thresholds, refer to Appendix U (p. 1545).

The second largest contributor to total air pollutant emissions under each alternative is the combined category of non-oil and gas mineral development. For the planning area, this is estimated to primarily include bentonite, uranium, and gold exploration and mining and sand and gravel sales. The primary pollutant of concern from this category is PM_{10}. Particulate matter emissions (fugitive dust) are primarily caused by earth-moving activities and vehicular traffic on unpaved roads and surfaces associated with mine development and operation. Potential mining exploration and development activities result in the largest single contributor to estimated particulate matter (PM_{10} and $PM_{2.5}$) emissions. Particulate matter emissions from this category under all alternatives have the potential to adversely impact air quality by increasing ambient concentrations of particulate matter and decreasing visibility. Estimated emissions of NO_x, VOCs, and CO are substantially less for this category than for oil and gas development. Emissions of these pollutants could result in minor impacts to air quality by contributing to increased ambient concentrations of O_3. Estimated emissions of SO_2 and HAPs from this source category under all alternatives are minor and it is not likely that these emissions would result in major adverse impacts to air quality.

Two other source categories have estimated emissions that could result in impacts common to all alternatives. CO emissions from fire management activities, primarily prescribed fire, have the potential to result in increased ambient concentrations of O_3. CO and VOC emissions from trails and travel management, primarily OHV use, have the potential to result in increased ambient concentrations of O_3. Estimated emissions of other pollutants from these two source categories would not be likely to result in major impacts to air quality.

There are several federally designated Class I areas within 100 kilometers (approximately 60 miles) of the planning area. Bridger Wilderness Area comprises the western border of the planning area. Fitzpatrick Wilderness Area is in the planning area on the west. Washakie Wilderness Area lies to the north and Teton Wilderness Area lie to the northwest. Although farther away than 100 kilometers, Yellowstone National Park and Grand Teton National Park are to the west and northwest of the planning area. Management actions and activities under each of the alternatives could impact Air Quality Related Values (i.e., visibility and atmospheric deposition) in these areas.

The Wyoming DEQ has the authority to implement emissions controls for sources requiring air permits under Wyoming Air Quality Standards and Regulations and to ensure that those sources do not contribute to an exceedance of an ambient air quality standard. To facilitate this process, the BLM works in cooperation with Wyoming DEQ and other federal agencies to share, review, and analyze emissions data, modeling results, and mitigation measures for development projects. This cooperation would continue under all alternatives. In addition, the BLM could require implementation of BMPs and mitigation measures within its authority to minimize adverse impacts to air quality from development projects. Determination and application of such measures would be completed during project approval, and would be subject to NEPA analysis at that time. Refer to Appendix U (p. 1545) for additional information on BMPs and mitigation measures.

Management under all alternatives must adhere to the Lander Air Resources Management Plan (Appendix F (p. 1401)), which was developed to address air quality issues identified during the analysis for this document. The plan outlines specific requirements for managing air resources and authorizing activities that have the potential to adversely impact air resources within the planning area. The plan also provides specific requirements for projects that have the potential to generate air emissions and adversely impact air resources within the planning area. In accordance with the plan, quantitative air quality modeling of industrial activities may be required in order to determine the potential impacts of proposed emission sources and subsequent potential mitigation strategies.

Table 4.4, “Estimated Annual Emissions by Activity – Base Year 2008” (p. 548) lists the estimated emissions for each pollutant from each emissions-generating activity analyzed for the base year 2008. Individual alternatives analyses compare estimated emissions to the baseline emissions.

Table 4.4. Estimated Annual Emissions by Activity – Base Year 2008

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Leasable Minerals - Oil and Natural Gas	125	29	449	4	206	1,498	247	2,558
Leasable Minerals - Coalbed Natural Gas	4	1	4	0	2	2	0	13
Total Oil and Gas minerals	129	30	453	4	208	1,500	248	2,571

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Locatable Minerals - Bentonite Mining	101	11	0	0	0	0	0	113
Locatable Minerals - Gold Mining	1	0	0	0	0	0	0	2
Locatable Minerals - Uranium Mining	37	6	30	1	13	3	0	89
Salable Minerals - Sand and Gravel	282	39	174	4	81	13	1	594
Total Non-Oil and Gas Minerals	422	56	204	5	94	15	2	797
Fire and Fuels Management	71	30	8	2	271	14	1	397
Vegetation – Forests, Woodlands, and Aspen Communities	38	4	0	0	5	1	0	48
Land Resources - Renewable Energy, ROWs and Corridors	13	1	2	0	1	0	0	18
Land Resources - Comprehensive Trails and Travel Management	9	6	6	1	472	191	19	704
Land Resources - Livestock Grazing	80	8	5	0	86	4	0	183

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
TOTAL	**761**	**135**	**678**	**11**	**1,138**	**1,726**	**270**	**4,719**

Source: Appendix U (p. 1545)

CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
ROWs rights-of-way
SO_2 sulfur dioxide
VOC volatile organic compound

4.1.1.3.3. Alternative A

Table 4.5, “Estimated Emissions by Activity (tons per year) under Alternative A, 2018” (p. 551) and Table 4.6, “Estimated Emissions by Activity (tons per year) under Alternative A, 2027” (p. 552) show the estimated emissions for each pollutant from each emission-generating activity analyzed for Alternative A in 2018 and 2027, respectively. Appendix U (p. 1545) provides the detailed emissions spreadsheets that are the basis for these tables. Non-oil and gas minerals development accounts for the greatest estimated emissions of PM_{10} and $PM_{2.5}$. Oil and gas development accounts for the greatest estimated emissions for all other pollutants. It is important to note that the emissions estimates for these two categories are based on reasonably foreseeable estimates of future development and might not reflect actual emissions at the time of development.

Although estimated emissions are dominated by mineral development, the second highest source of CO and VOC emissions under this alternative is from the Comprehensive Trails and Travel Management sector. These emissions are generated primarily from OHVs (including all-terrain vehicles, over-snow vehicles, and dirt bikes) and trail and road maintenance equipment.

Alternative A emissions estimates for 2018 show an increase of emissions of all pollutants over the baseline year. The most substantial increases are projected to be for particulate matter, NO_x, VOCs, and HAPs, with percent increases all more than 170 percent. Figure 4.3, “Contribution of Each Category to Total PM_{10} Emissions under Alternative A, 2018” (p. 553) through Figure 4.6, “Contribution of Each Category to Total HAPs Emissions under Alternative, A 2018” (p. 556) show the relative contribution of each source category to emissions of these four pollutants. Alternative A emissions estimates for 2027 show decreases in all pollutants from 2018 levels in the range of 5 to 22 percent, depending on the pollutant. This is likely due to decreases in oil and gas production and mining activities over the long term. It is likely that the increases in estimated emissions over baseline would result in increased concentrations of ambient O_3 and NO_x, and short-term impacts to visibility. Given the current background levels of pollutants, it is not likely that emissions under Alternative A would contribute to an exceedance of a national or state ambient air quality standard.

Table 4.5. Estimated Emissions by Activity (tons per year) under Alternative A, 2018

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Leasable Minerals - Oil and Natural Gas	371	87	1,325	11	607	4,401	725	7,528
Leasable Minerals - Coalbed Natural Gas	60	15	256	1	126	173	44	675
Total Oil and Gas minerals	431	101	1,582	12	733	4,574	769	8,203
Locatable Minerals - Bentonite Mining	542	59	10	0	12	2	0	625
Locatable Minerals - Gold Mining	314	77	8	0	5	1	0	406
Locatable Minerals - Uranium Mining	254	34	128	3	55	12	1	487
Salable Minerals - Sand and Gravel	330	41	79	4	39	9	1	504
Total Non-Oil and Gas Minerals	1,440	211	225	8	111	25	2	2,022
Fire and Fuels Management	55	27	8	2	271	14	1	378
Vegetation – Forests, Woodlands, and Aspen Communities	138	14	0	0	5	1	0	158
Land Resources - Renewable Energy, ROWs and Corridors	45	5	2	0	1	0	0	54

Emission Generating Activity	PM$_{10}$	PM$_{2.5}$	NO$_x$	SO$_2$	CO	VOCs	HAPs	Total Air Pollutant Emissions
Land Resources - Comprehensive Trails and Travel Management	7	4	7	1	526	119	12	676
Land Resources - Livestock Grazing	80	8	4	0	86	4	0	183
Total	**2,195**	**371**	**1,829**	**23**	**1,734**	**4,737**	**786**	**11,674**
Percent Change over Base Year	**188**	**174**	**170**	**109**	**52**	**174**	**191**	**147**

Source: Appendix U (p. 1545)

CO carbon monoxide
HAPs hazardous air pollutants
NO$_x$ nitrogen oxides
PM$_{2.5}$ particulate matter less than 2.5 microns in diameter
PM$_{10}$ particulate matter less than 10 microns in diameter
ROWs rights-of-way
SO$_2$ sulfur dioxide
VOC volatile organic compound

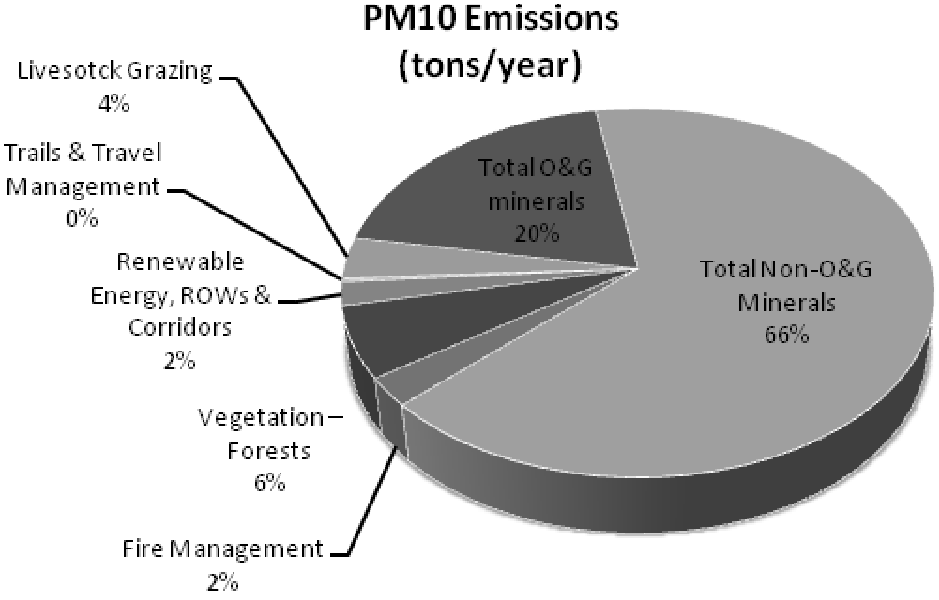
Table 4.6. Estimated Emissions by Activity (tons per year) under Alternative A, 2027

Emission Generating Activity	PM$_{10}$	PM$_{2.5}$	NO$_x$	SO$_2$	CO	VOCs	HAPs	Total Air Pollutant Emissions
Leasable Minerals - Oil and Natural Gas	326	76	1,115	11	501	3,435	563	6,027
Leasable Minerals - Coalbed Natural Gas	57	14	233	1	114	156	40	614
Total Oil and Gas minerals	383	89	1,348	12	615	3,592	603	6,641
Locatable Minerals - Bentonite Mining	542	59	5	0	10	1	0	617
Locatable Minerals - Gold Mining	310	76	8	0	5	1	0	401

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Locatable Minerals - Uranium Mining	177	26	120	3	52	12	1	391
Salable Minerals - Sand and Gravel	313	37	27	3	17	8	1	406
Total Non-Oil and Gas Minerals	1,341	198	160	7	84	22	2	1,815
Fire and Fuels Management	55	27	8	2	271	14	1	378
Vegetation – Forests, Woodlands, and Aspen Communities	138	14	0	0	5	1	0	158
Land Resources - Renewable Energy, ROWs and Corridors	45	5	1	0	1	0	0	52
Land Resources - Comprehensive Trails and Travel Management	6	3	8	1	522	88	9	637
Land Resources - Livestock Grazing	80	8	4	0	86	4	0	183
Total	**2,047**	**344**	**1,528**	**22**	**1,583**	**3,722**	**616**	**9,863**
Percent Change from 2018	**-7**	**-7**	**-16**	**-5**	**-9**	**-21**	**-22**	**-16**

Source: Appendix U (p. 1545)

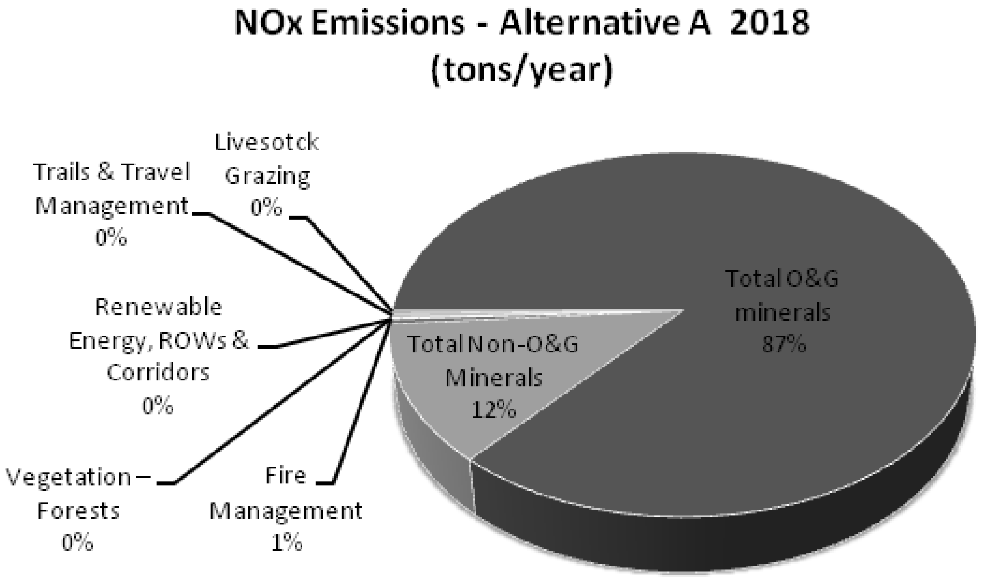
CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
ROWs rights-of-way
SO_2 sulfur dioxide
VOC volatile organic compound



Source: Appendix U (p. 1545)

O&G oil and gas
PM_{10} particulate matter less than 10 microns in diameter
ROWs rights-of-way

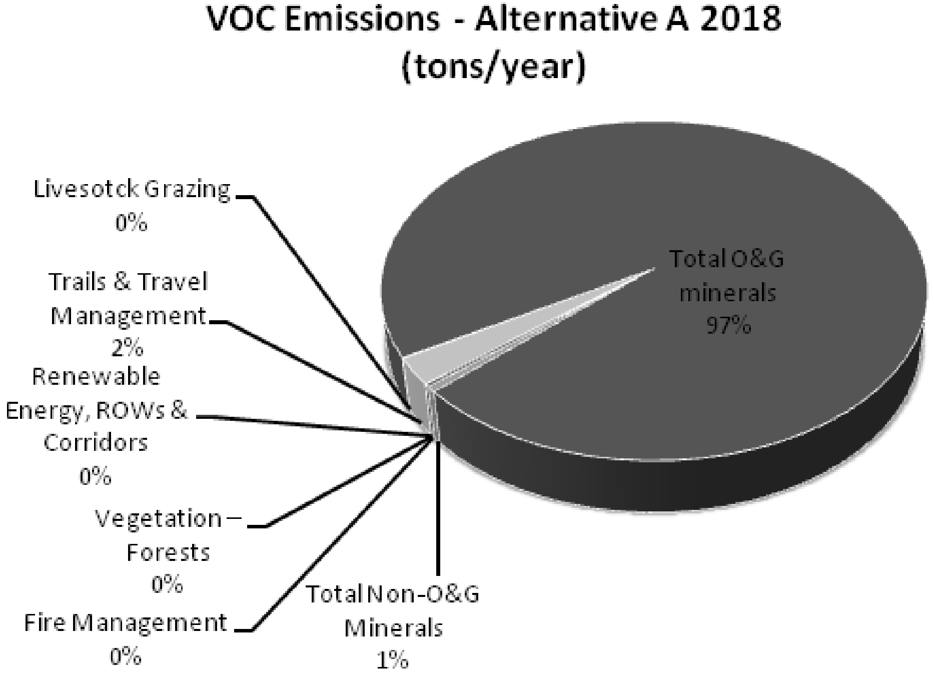
Figure 4.3. Contribution of Each Category to Total PM_{10} Emissions under Alternative A, 2018



Source: Appendix U (p. 1545)

NO_X nitrogen oxides
O&G oil and gas
ROWs rights-of-way

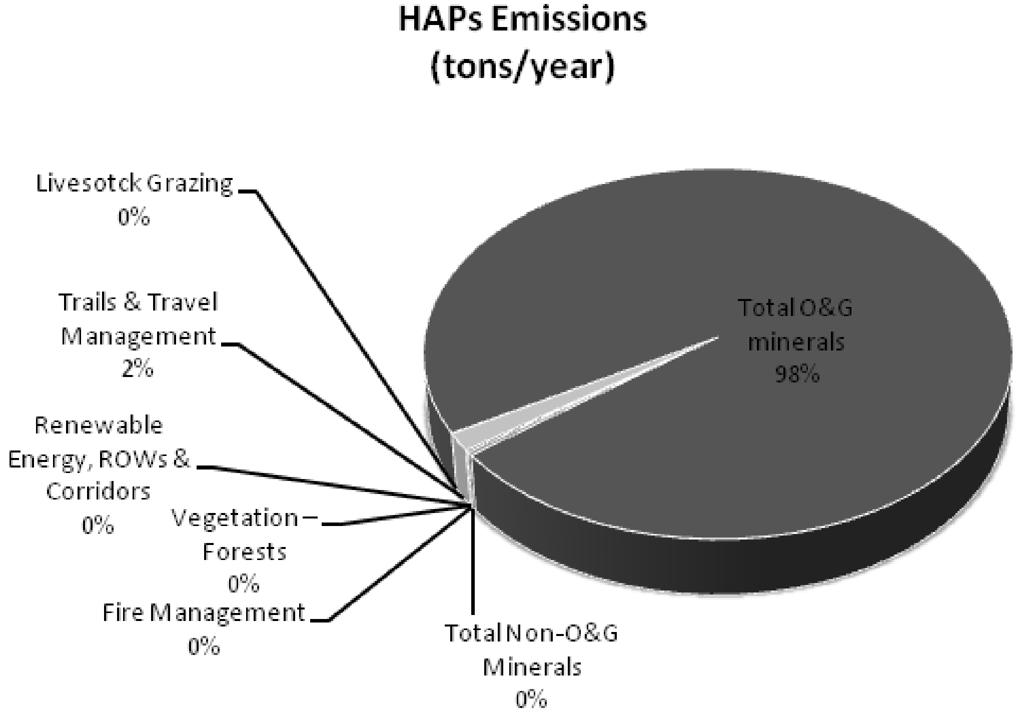
Figure 4.4. Contribution of Each Category to Total NO_x Emissions under Alternative A, 2018



Source: Appendix U (p. 1545)

O&G oil and gas
ROWs rights-of-way
VOC volatile organic compound

Figure 4.5. Contribution of Each Category to Total VOCs Emissions under Alternative A, 2018



Source: Appendix U (p. 1545)

HAPs hazardous air pollutants
O&G oil and gas
ROWs rights-of-way

Figure 4.6. Contribution of Each Category to Total HAPs Emissions under Alternative, A 2018

4.1.1.3.4. Alternative B

Alternative B emissions estimates are the lowest of all the alternatives for total air pollutant emissions and for each analyzed pollutant except CO and SO_2. Table 4.7, "Estimated Annual Emissions by Activity (tons per year) under Alternative B, 2018" (p. 558) and Table 4.8, "Estimated Annual Emissions by Activity (tons per year) under Alternative B, 2027" (p. 560) show the estimated emissions for each pollutant from each emission-generating activity analyzed for Alternative B in 2018 and 2027, respectively. See Appendix U (p. 1545) for additional details on emissions calculations.

The overall lower estimated emissions under this alternative are due to restrictions on oil and gas development, potential restrictions on bentonite mining in designated Areas of Critical Environmental Concern (ACECs), lower projected acres of disturbance for ROWs and corridors, no new development under livestock grazing, and no new renewable-energy development. The greater emissions of CO and SO_2 estimated for this alternative are due primarily to the larger acreage of disturbance predicted for prescribed fire. Figure 4.7, "Contribution of Each Category to Total CO Emissions under Alternative B, 2018" (p. 561) and Figure 4.8, "Contribution of Each Category to Total SO_2 Emissions under Alternative B, 2018" (p. 562) show the relative contribution of fire management activities to the emissions of these two pollutants. Alternative B acres of disturbance due to prescribed fire are triple the amount under alternatives A and C and double the amount under Alternative D. This would result in more smoke being generated by prescribed fire under this alternative than under other alternatives, and larger emissions of CO and SO_2 from this source category. Overall, emissions under this alternative for 2018 are estimated to increase by 83 to -142 percent over baseline emissions, depending on the pollutant.

Like Alternative A, potential oil and gas activities are the predominant source of NO_x, VOC, and HAPs emissions and potential mining activities are the predominant source of PM_{10} and $PM_{2.5}$ under Alternative B. The second largest source of VOC emissions is projected for the Comprehensive Trails and Travel Management sector, which includes emissions from OHVs and road and trail maintenance vehicles. Alternative B emissions estimates for 2027 show decreases in all pollutants from 2018 levels in the range of 4 to 22 percent, depending on the pollutant. This is likely due to decreases in oil and gas production and mining activities over the long term.

Impacts to O_3 ambient concentrations from emissions of NO_x, VOC, and CO under Alternative B are expected to be the least of all of the alternatives, as are impacts to particulate matter concentrations. Impacts to visibility could result from projected mineral development activities, but would be the least under Alternative B.

Table 4.7. Estimated Annual Emissions by Activity (tons per year) under Alternative B, 2018

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Leasable Minerals - Oil and Natural Gas	312	73	1,120	9	516	3,796	627	6,453
Leasable Minerals - Coalbed Natural Gas	13	3	51	0	25	34	9	134
Total Oil and Gas minerals	325	76	1,171	9	541	3,830	635	6,587
Locatable Minerals - Bentonite Mining	147	16	3	0	4	1	0	171
Locatable Minerals - Gold Mining	314	77	8	0	5	1	0	406
Locatable Minerals - Uranium Mining	254	34	128	3	55	12	1	487
Salable Minerals - Sand and Gravel	319	40	76	4	38	9	1	486
Total Non-Oil and Gas Minerals	1,033	167	215	7	101	23	2	1,550

Emission Generating Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_2**	**CO**	**VOCs**	**HAPs**	**Total Air Pollutant Emissions**
Fire and Fuels Management	178	90	25	7	902	47	5	1,254
Vegetation – Forests, Woodlands, and Aspen Communities	199	20	0	0	5	1	0	225
Land Resources - Renewable Energy, ROWs and Corridors	19	2	1	0	1	0	0	23
Land Resources - Comprehensive Trails and Travel Management	6	4	7	1	526	119	12	675
Land Resources - Livestock Grazing	0	0	0	0	0	0	0	0
TOTAL	**1,760**	**359**	**1,420**	**24**	**2,077**	**4,019**	**654**	**10,315**
Percent Change over Base Year	**131**	**165**	**110**	**121**	**83**	**133**	**142**	**119**

Source: Appendix U (p. 1545)

CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
ROWs rights-of-way
SO_2 sulfur dioxide
VOC volatile organic compound

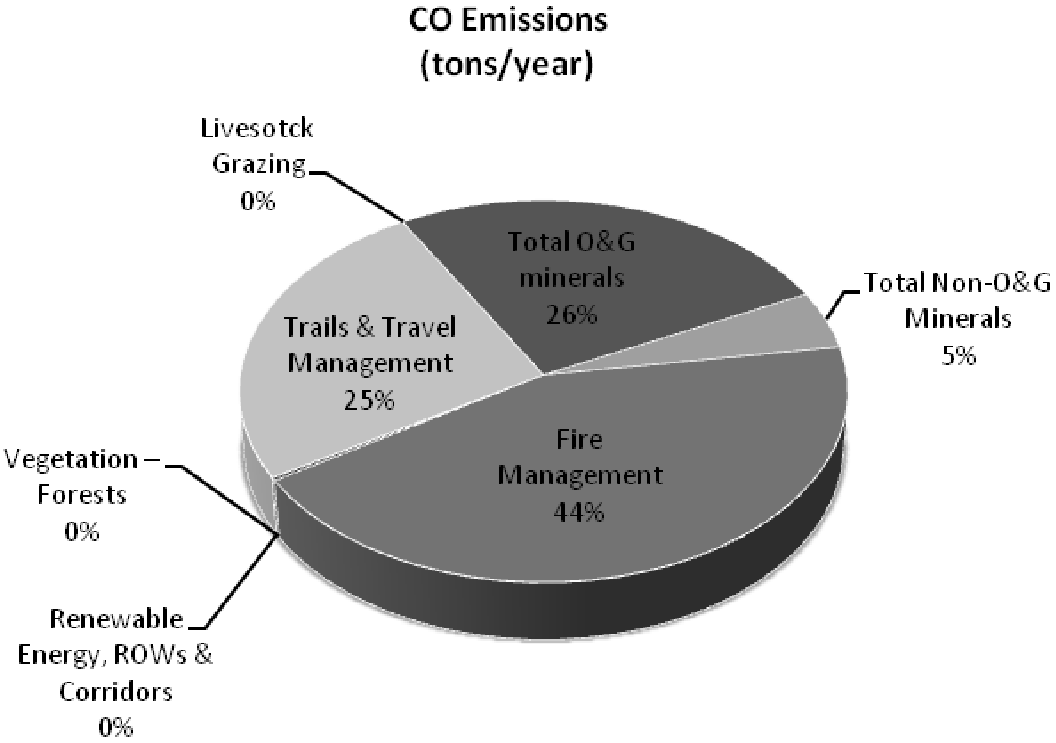
Table 4.8. Estimated Annual Emissions by Activity (tons per year) under Alternative B, 2027

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Leasable Minerals - Oil and Natural Gas	273	63	938	9	424	2,957	485	5,149
Leasable Minerals - Coalbed Natural Gas	13	3	46	0	23	30	8	123
Total Oil and Gas minerals	285	66	984	9	447	2,988	493	5,272
Locatable Minerals - Bentonite Mining	147	16	1	0	3	0	0	168
Locatable Minerals - Gold Mining	310	76	8	0	5	1	0	401
Locatable Minerals - Uranium Mining	177	26	120	3	52	12	1	391
Salable Minerals - Sand and Gravel	301	36	26	3	16	8	1	391
Total Non-Oil and Gas Minerals	934	154	156	7	77	21	2	1,351
Fire and Fuels Management	178	90	25	7	902	47	5	1,254
Vegetation – Forests, Woodlands, and Aspen Communities	199	20	0	0	5	1	0	225
Land Resources - Renewable Energy, ROWs and Corridors	19	2	0	0	0	0	0	21

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Land Resources - Comprehensive Trails and Travel Management	5	3	8	1	522	88	9	636
Land Resources - Livestock Grazing	0	0	0	0	0	0	0	0
TOTAL	**1,621**	**335**	**1,173**	**23**	**1,953**	**3,145**	**509**	**8,760**
Percent Change from 2018	**-8**	**-7**	**-17**	**-4**	**-6**	**-22**	**-22**	**-15**

Source: Appendix U (p. 1545)

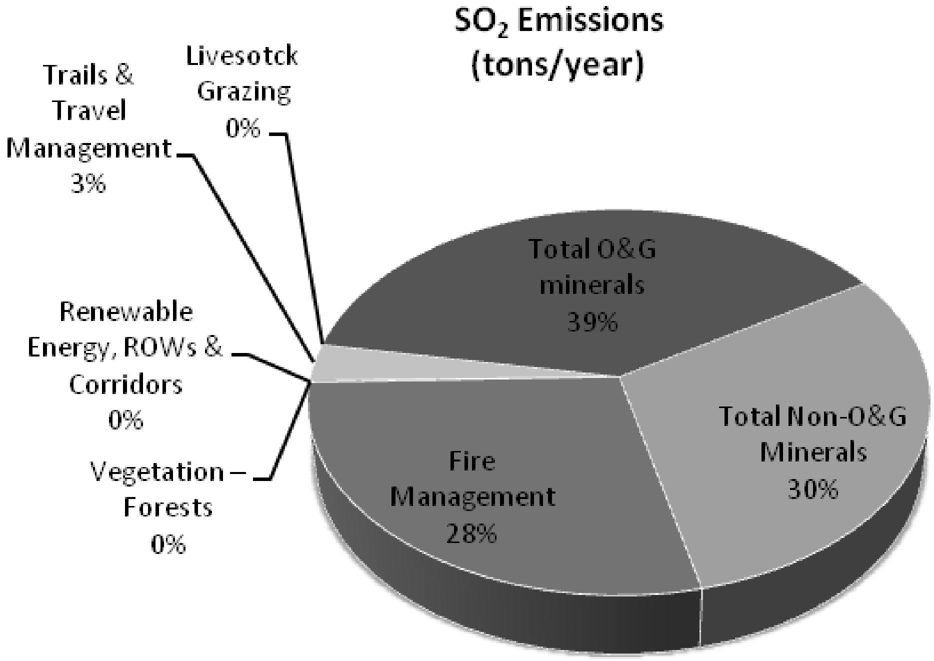
CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
ROWs rights-of-way
SO_2 sulfur dioxide
VOC volatile organic compound



Source: Appendix U (p. 1545)

CO carbon monoxide
O&G oil and gas
ROWs rights-of-way

Figure 4.7. Contribution of Each Category to Total CO Emissions under Alternative B, 2018



Source: Appendix U (p. 1545)

SO_2 sulfur dioxide
O&G oil and gas
ROWs rights-of-way

Figure 4.8. Contribution of Each Category to Total SO_2 Emissions under Alternative B, 2018

4.1.1.3.5. Alternative C

Table 4.9, “Estimated Annual Emissions by Activity (tons per year) under Alternative C, 2018” (p. 564) and Table 4.10, “Estimated Annual Emissions by Activity (tons per year) under Alternative C, 2027” (p. 566) lists estimated emissions under Alternative C for 2018 and 2027, respectively. Alternative C would result in the greatest estimated emissions of all the alternatives for total air pollutant emissions and for each analyzed pollutant except CO. Alternative C allows for the most development of mineral resources and includes a large potential wind-energy project with up to 2,400 turbines. In addition, Alternative C allows for increased acres of disturbance for forestry projects and ROW projects. All of these management actions and activities account for increased levels of air pollutant emissions. The estimated acreage for prescribed fire under this alternative is approximately ½ the acreage estimated for Alternative B; this accounts for the lower estimated CO emissions under this alternative. Estimated emissions for 2018 under this alternative are projected to increase by 55 to 279 percent over baseline emissions, depending on the pollutant.

Like alternatives A and B, the primary contributors to air pollutant emissions under Alternative C are non-oil and gas minerals development and oil and gas development. However, the most noticeable difference in emissions between this alternative and alternatives A and B is the increase in particulate matter emissions due primarily to potential projects in the renewable energy and ROW sectors. The increases in particulate matter would result from short-term construction-related activities. Any impacts that could result from these emissions would likely be short in duration. Figure 4.9, “Contribution of Each Category to Total PM_{10} Emissions under Alternative C, 2018” (p. 567) and Figure 4.10, “Contribution of Each Category to Total $PM_{2.5}$ Emissions under Alternative C, 2018” (p. 568) show the relative contribution of these sectors to total PM_{10} and $PM_{2.5}$ emissions, respectively.

Although estimated emissions are dominated by mineral and renewable energy development, the second highest source of CO and VOC emissions under this alternative is from the Comprehensive Trails and Travel Management sector. These emissions are generated primarily from OHVs (including all-terrain vehicles, over-snow vehicles, and dirt bikes) and trail and road maintenance equipment. Alternative C emissions estimates for 2027 show decreases in all pollutants from 2018 levels in the range of 5 to 22 percent, depending on the pollutant. This is likely due to decreases in oil and gas production and mining activities over the long term.

It is likely that the increases in estimated emissions over baseline would result in increased concentrations of ambient O_3, NO_x, and particulate matter, and potential impacts to visibility. Given the current background levels of pollutants, it is not likely that emissions under Alternative C would contribute to an exceedance of a national or state ambient air quality standard.

Table 4.9. Estimated Annual Emissions by Activity (tons per year) under Alternative C, 2018

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Leasable Minerals - Oil and Natural Gas	371	87	1,328	11	608	4,410	727	7,542
Leasable Minerals - Coalbed Natural Gas	61	15	258	1	127	175	44	682
Total Oil and Gas minerals	433	102	1,586	12	736	4,585	771	8,225
Locatable Minerals - Bentonite Mining	542	59	10	0	12	2	0	625
Locatable Minerals - Gold Mining	314	77	8	0	5	1	0	406
Locatable Minerals - Uranium Mining	254	34	128	3	55	12	1	487
Salable Minerals - Sand and Gravel	387	49	95	5	47	11	1	595
Total Non-Oil and Gas Minerals	1,497	218	241	9	119	26	3	2,113

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Fire and Fuels Management	58	28	8	2	271	14	1	382
Vegetation – Forests, Woodlands, and Aspen Communities	269	27	0	0	5	1	0	302
Land Resources - Renewable Energy, ROWs and Corridors	539	56	26	1	14	4	0	641
Land Resources - Comprehensive Trails and Travel Management	7	4	7	1	526	119	12	677
Land Resources - Livestock Grazing	84	8	5	0	87	4	0	189
TOTAL	**2,887**	**443**	**1,873**	**25**	**1,758**	**4,754**	**788**	**12,529**
Percent Change over Base Year	**279**	**228**	**176**	**125**	**55**	**175**	**192**	**166**

Source: Appendix U (p. 1545)

CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
ROWs rights-of-way
SO_2 sulfur dioxide
VOC volatile organic compound

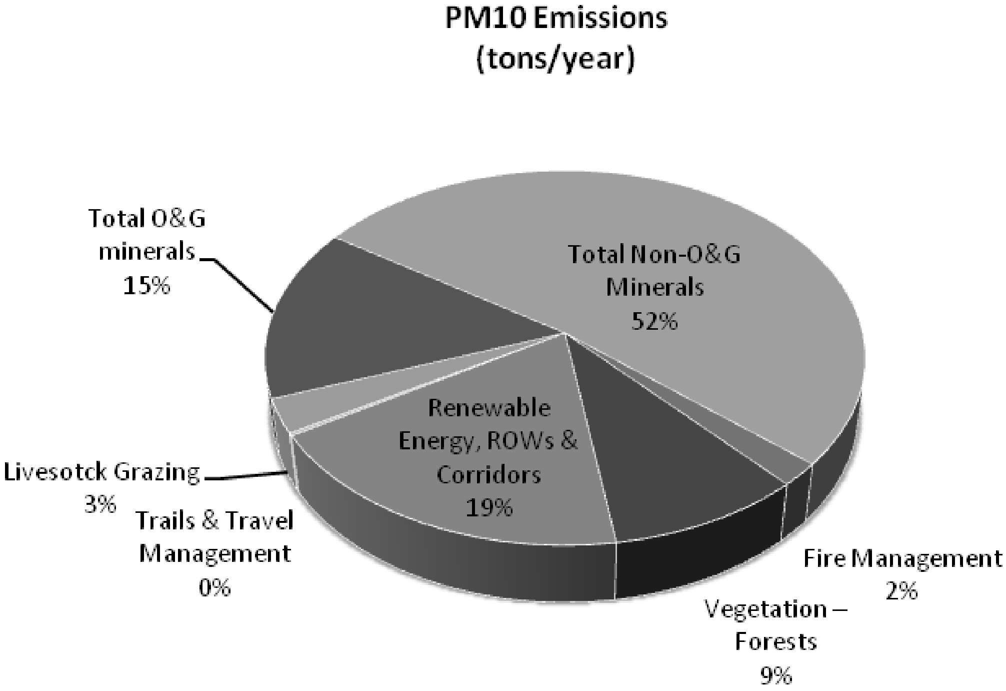
Table 4.10. Estimated Annual Emissions by Activity (tons per year) under Alternative C, 2027

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Leasable Minerals - Oil and Natural Gas	327	76	1,117	11	501	3,442	564	6,037
Leasable Minerals - Coalbed Natural Gas	57	14	235	1	115	158	40	619
Total Oil and Gas minerals	384	89	1,351	12	617	3,599	604	6,656
Locatable Minerals - Bentonite Mining	542	59	5	0	10	1	0	617
Locatable Minerals - Gold Mining	310	76	8	0	5	1	0	401
Locatable Minerals - Uranium Mining	177	26	120	3	52	12	1	391
Salable Minerals - Sand and Gravel	370	44	33	4	21	9	1	481
Total Non-Oil and Gas Minerals	1,398	205	165	8	88	24	2	1,890
Fire and Fuels Management	58	28	8	2	271	14	1	382
Vegetation – Forests, Woodlands, and Aspen Communities	269	27	0	0	5	1	0	302
Land Resources - Renewable Energy, ROWs and Corridors	539	55	9	1	6	3	0	614

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Land Resources - Comprehensive Trails and Travel Management	6	3	8	1	522	88	9	637
Land Resources - Livestock Grazing	84	8	5	0	87	4	0	189
TOTAL	**2,737**	**416**	**1,546**	**24**	**1,596**	**3,734**	**617**	**10,670**
Percent Change from 2018	**-5**	**-6**	**-17**	**-5**	**-9**	**-21**	**-22**	**-15**

Source: Appendix U (p. 1545)

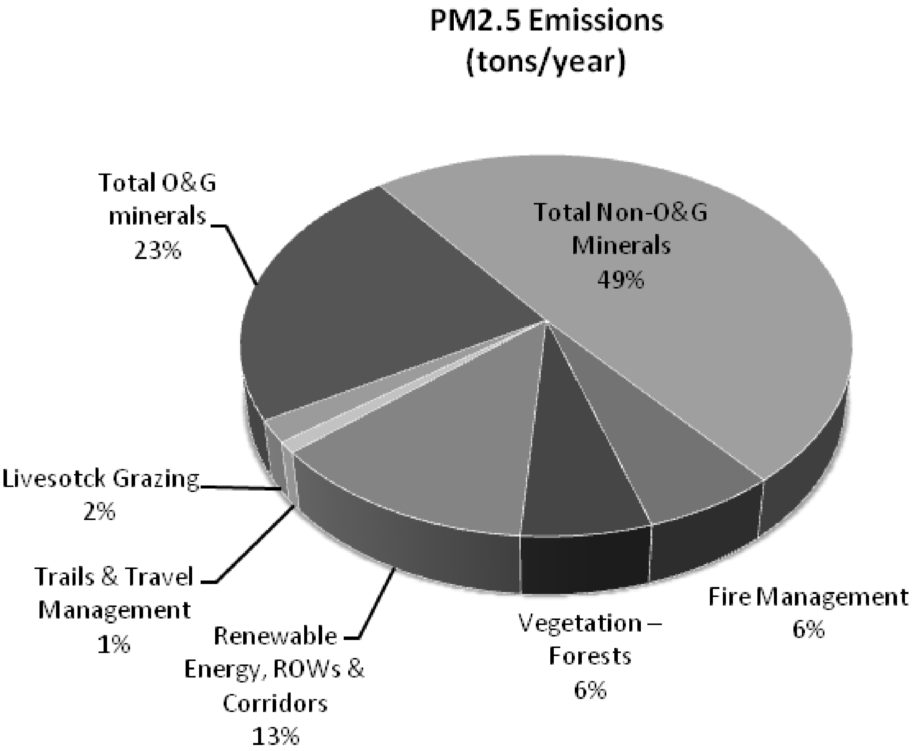
CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
ROWs rights-of-way
SO_2 sulfur dioxide
VOC volatile organic compound



Source: Appendix U (p. 1545)

PM_{10} particulate matter less than 10 microns in diameter
O&G oil and gas
ROWs rights-of-way

Figure 4.9. Contribution of Each Category to Total PM_{10} Emissions under Alternative C, 2018



Source: Appendix U (p. 1545)

$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
O&G oil and gas
ROWs rights-of-way

Figure 4.10. Contribution of Each Category to Total $PM_{2.5}$ Emissions under Alternative C, 2018

4.1.1.3.6. Alternative D

Alternative D estimated total emissions are the second lowest of the four alternatives. Estimated emissions of PM_{10}, NO_x, VOCs, and HAPs under this alternative rank next to lowest of the four alternatives. This is due to less projected oil and gas development, locatable mineral development, renewable-energy development, and fewer ROW projects under this alternative than under alternatives A and C. Estimated emissions of $PM_{2.5}$ and SO_2 are predicted to be slightly greater under this alternative than under alternatives A and B, and estimated emissions of CO are predicted to be greater under this alternative than under alternatives A and C due primarily to the increased acreage of disturbance predicted for prescribed fire. Estimated emissions for 2018 for this alternative are projected to increase by 65 to 181 percent over baseline, depending on the pollutant. Alternative D emissions estimates for 2027 show decreases in all pollutants from 2018 levels in the range of 5 to 22 percent, depending on the pollutant. This is likely due to decreases in oil and gas production and mining activities over the long term.

Table 4.11, "Estimated Annual Emissions by Activity (tons per year) under Alternative D, 2018" (p. 570) and Table 4.12, "Estimated Annual Emissions by Activity (tons per year) under Alternative D, 2027" (p. 572) lists estimated emissions under Alternative D for 2018 and 2027, respectively. Under this alternative, oil and gas development is the dominant category of estimated emissions of NO_x, SO_2, VOCs, and HAPs. Non-oil and gas development accounts for most of PM_{10} and $PM_{2.5}$ emissions. Total air pollutant emissions are dominated by these two source categories under this and the other alternatives. Figure 4.11, “Contribution of Oil and Gas Development Emissions to Total Emissions by Alternative, 2018” (p. 573) and Figure 4.12, “Contribution of Non-Oil and Gas Mineral Development Emissions to Total Emissions by Alternative, 2018” (p. 574) are provided as a tool to compare the contribution of these sectors to total emissions among alternatives. Figure 4.11, “Contribution of Oil and Gas Development Emissions to Total Emissions by Alternative, 2018” (p. 573) shows the contributions from oil and gas development under all alternatives; Figure 4.12, “Contribution of Non-Oil and Gas Mineral Development Emissions to Total Emissions by Alternative, 2018” (p. 574) shows the contributions from non-oil and gas mineral development (mining) sector.

Although estimated emissions of the air pollutants analyzed are dominated by mineral development, the second highest source of CO and VOC emissions under this alternative is from the Comprehensive Trails and Travel Management sector. These emissions are generated primarily from OHVs (including all-terrain vehicles, over-snow vehicles, and dirt bikes) and trail and road maintenance equipment.

Potential impacts to air quality under Alternative D include potential increases in ambient concentrations of O_3, NO_x, and particulate matter, and potential impacts to visibility. Given the current background levels of pollutants, it is not likely that emissions under Alternative D would contribute to an exceedance of a national or state ambient air quality standard. However, under this alternative, proponents of mineral development projects (or any project likely to impact air quality) will be required to demonstrate compliance with ambient air quality standards and other federal, state, and local air quality regulations. This demonstration could include air dispersion modeling, photochemical grid modeling, and the application of mitigation measures and control technologies prior to project authorization by the BLM.

Table 4.11. Estimated Annual Emissions by Activity (tons per year) under Alternative D, 2018

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Leasable Minerals - Oil and Natural Gas	358	84	1,282	11	588	4,274	705	7,301
Leasable Minerals - Coalbed Natural Gas	52	12	217	1	107	147	37	572
Total Oil and Gas minerals	410	96	1,498	12	695	4,421	742	7,873
Locatable Minerals - Bentonite Mining	395	43	7	0	8	1	0	454
Locatable Minerals - Gold Mining	314	77	8	0	5	1	0	406

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Locatable Minerals - Uranium Mining	254	34	128	3	55	12	1	487
Salable Minerals - Sand and Gravel	330	41	79	4	39	9	1	504
Total Non-Oil and Gas Minerals	1,293	195	222	8	107	24	2	1,852
Fire and Fuels Management	75	43	13	3	450	23	2	610
Vegetation – Forests, Woodlands, and Aspen Communities	217	22	0	0	5	1	0	245
Land Resources - Renewable Energy, ROWs and Corridors	37	4	2	0	1	0	0	44
Land Resources - Comprehensive Trails and Travel Management	7	4	7	1	526	119	12	676
Land Resources - Livestock Grazing	84	8	5	0	87	4	0	189
TOTAL	**2,122**	**373**	**1,747**	**24**	**1,872**	**4,592**	**759**	**11,489**
Percent Change over Base Year	**179**	**176**	**158**	**114**	**65**	**166**	**181**	**143**

Source: Appendix U (p. 1545)

CO carbon monoxide
HAPs hazardous air pollutants
NO_X nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
ROWs rights-of-way
SO_2 sulfur dioxide
VOC volatile organic compound

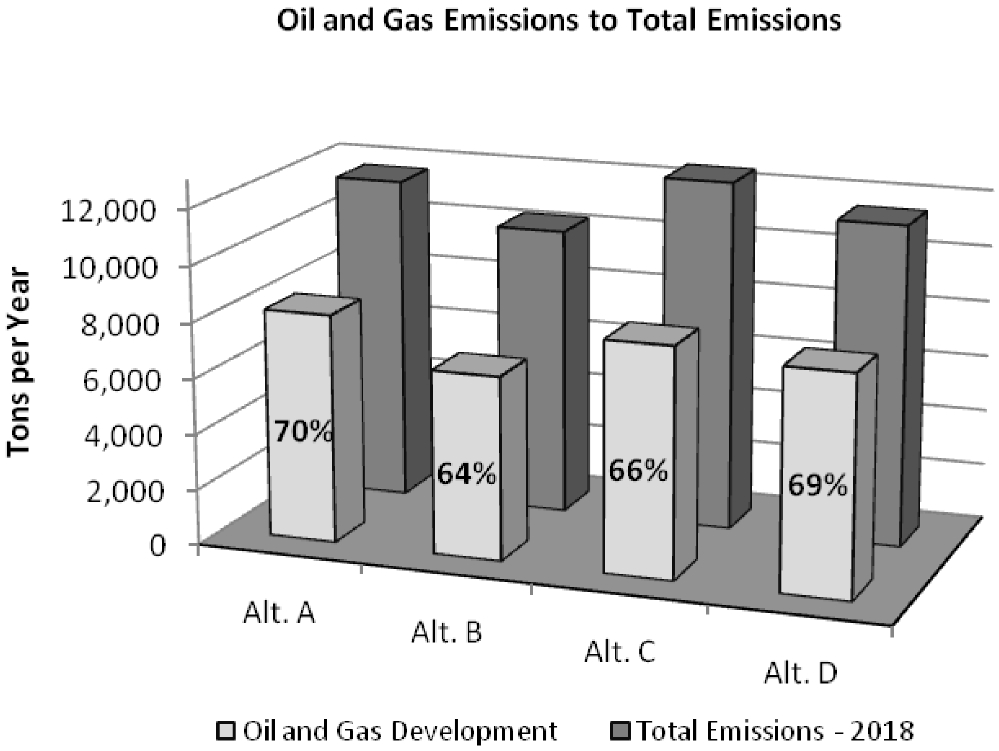
Table 4.12. Estimated Annual Emissions by Activity (tons per year) under Alternative D, 2027

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Leasable Minerals - Oil and Natural Gas	315	73	1,077	10	484	3,335	547	5,841
Leasable Minerals - Coalbed Natural Gas	49	12	196	1	96	132	33	520
Total Oil and Gas minerals	364	84	1,274	11	581	3,467	580	6,361
Locatable Minerals - Bentonite Mining	395	43	3	0	7	1	0	449
Locatable Minerals - Gold Mining	310	76	8	0	5	1	0	401
Locatable Minerals - Uranium Mining	177	26	120	3	52	12	1	391
Salable Minerals - Sand and Gravel	313	37	27	3	17	8	1	406
Total Non-Oil and Gas Minerals	1,194	182	158	7	81	22	2	1,647
Fire and Fuels Management	75	43	13	3	450	23	2	610
Vegetation – Forests, Woodlands, and Aspen Communities	217	22	0	0	5	1	0	245
Land Resources - Renewable Energy, ROWs and Corridors	37	4	1	0	0	0	0	42

Emission Generating Activity	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOCs	HAPs	Total Air Pollutant Emissions
Land Resources - Comprehensive Trails and Travel Management	6	3	8	1	522	88	9	637
Land Resources - Livestock Grazing	84	8	5	0	87	4	0	189
TOTAL	**1,976**	**347**	**1,458**	**23**	**1,727**	**3,606**	**594**	**9,730**
Percent Change from 2018	**-7**	**-7**	**-17**	**-5**	**-8**	**-21**	**-22**	**-15**

Source: Appendix U (p. 1545)

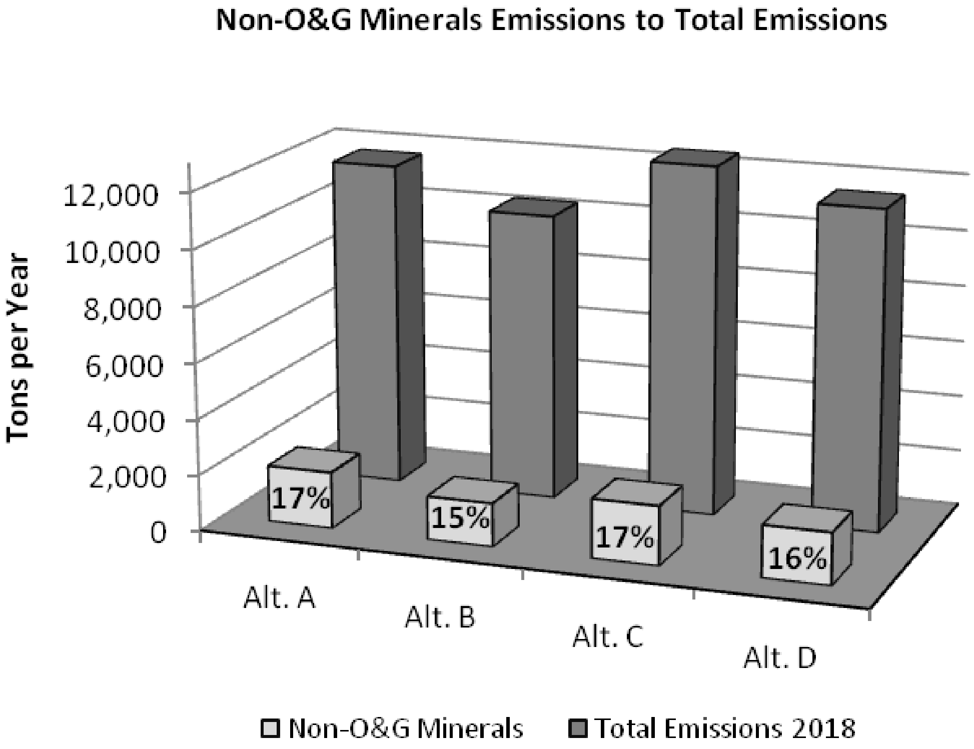
CO carbon monoxide
HAPs hazardous air pollutants
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
ROWs rights-of-way
SO_2 sulfur dioxide
VOC volatile organic compound



Source: Appendix U (p. 1545)

Alt. Alternative

Figure 4.11. Contribution of Oil and Gas Development Emissions to Total Emissions by Alternative, 2018



Source: Appendix U (p. 1545)

Alt. Alternative
O&G oil and gas

Figure 4.12. Contribution of Non-Oil and Gas Mineral Development Emissions to Total Emissions by Alternative, 2018

4.1.2. Geologic Resources

There are no management actions associated with geologic resources. Management associated with certain geologic features, such as Beaver Rim and Red Canyon, are addressed in the section that addresses management of the specific values associated with the feature, such as visual resources management of the geologic features of Beaver Rim.

Health and safety issues associated with geologic features, such as earthquake potential, are addressed in the *Health and Safety* section.

4.1.3. Soil

Direct adverse impacts to soil resources result from actions that remove vegetative cover, compact soil, reduce infiltration, create changes in physical and biological properties, and reduce organic matter content. These direct impacts to soils tend to result primarily from removing vegetative cover, loosening the surface soil, the formation of compacted layers, and increasing the potential for accelerated erosion by exposing soil particles to wind and water. Disrupting natural soil horizons and removing vegetation to construct roads, well pads, and other facilities cause a loss of soil productivity.

Disrupting soil stability, increasing compaction, and reducing productivity generally result in indirect adverse impacts to other resources. For example, adverse impacts to soil can degrade water quality through sedimentation of drainages and perennial waterbodies, degrade air quality through increased airborne particulate matter, and result in the loss of vegetation from a decrease in infiltration and an increase in surface water runoff. Although such indirect impacts to other resources are the result of soil disturbance, these impacts are analyzed in sections that address those other resources.

In addition to surface disturbance, surface uses that directly disturb the surface can affect soil stability through changes in vegetative cover or soil infiltration rates. Such surface uses include livestock grazing (improper livestock grazing management could allow livestock to damage vegetative cover and compact soil), vegetative treatments, cross-country travel, and fire and fuels management. Operating motorized vehicles, especially heavy equipment, on moist soils is likely to compact the surface layer. This can decrease infiltration and aeration and could reduce soil productivity by making it more difficult for plant roots to grow and obtain soil moisture and nutrients.

Short-term impacts to soils result during initial surface disturbance before vegetation can be reestablished or before other measures are implemented to minimize erosion from wind and water. The amount of bare ground predicted under each alternative after successful reclamation of disturbed areas is an indicator of long-term adverse impacts to soils. Areas not reclaimed and left with bare soil include roads and areas around facilities that experience concentrated surface uses by equipment or animals that would preclude the reestablishment of vegetation. There would be long-term impacts from accelerated erosion in locations where bare soils are allowed to remain exposed to wind and water. Other long-term impacts to soils include the loss of fertility through removing or greatly altering the soil profile in areas where facilities and structures are built.

4.1.3.1. Summary of Impacts

Alternative B would result in the least amount of surface disturbance and would impose the most restrictions on resource uses, resulting in the fewest adverse impacts to soil resources of any alternative. Conversely, based on anticipated surface disturbance alone, Alternative C would result in the most adverse impacts to soil resources. Alternative C manages surface disturbance more like Alternative A than Alternative B, and would result in impacts similar to Alternative A. Alternative D would result in beneficial impacts to soil resources similar to Alternative B.

4.1.3.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Approximately 161,076 acres of federal surface in Sweetwater and Carbon counties have no detailed soils data and are excluded from this analysis. Soil erosion hazard in these areas could not be determined, although general impacts to soils in these counties would likely be the same as those in the mapped areas.
- The potential for soil erosion has not been modeled for any portion of the planning area.
- Surface disturbance under each alternative could modify soils by disrupting soil stability, changing vegetative cover, decreasing productivity, and increasing compaction. If these modifications occur on highly erodible soils, the potential for accelerated erosion would be approximately 40 percent greater (USFS 2004b) than predicted for less erodible soils. From a soil resources perspective, the cause of surface disturbance makes relatively little difference in

the level of adverse impacts to soil. Some activities, such as wind-energy development, can result in more compaction, but this can be evaluated only on a site-specific basis. Accordingly, the acres of reasonably foreseeable long- and short-term disturbance are provided by resource use. The more disturbance, the more adverse impacts to soil resources.

- According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) National Soils Handbook (NRCS No Date), most soils on slopes greater than 15 percent experience soil erosion loss rates that are very difficult to control with standard erosion control measures, and very difficult to reclaim.
- Installing and maintaining erosion controls and implementing other impact mitigation measures, such as BMPs, results in a substantial reduction in soil erosion, ranging between 40 and 97 percent, depending on site conditions (USFS 2003). However, these measures might not reduce soil compaction and loss of productivity.
- Bare soil (without vegetation or other surface cover) with a surface layer that has been altered from its natural condition is more susceptible to accelerated erosion from wind and water than undisturbed soil.
- Soil compaction is considered a localized impact common to, for example, livestock concentration areas and cattle trails, particularly during times when soils are wet, and high-traffic areas such as roads, walking paths, hiking trails, or OHV trails.
- Short-term impacts to vegetation depend on the time it takes for a disturbed area to become revegetated, generally 1 to 5 years.
- The criteria for final stabilization requires uniform perennial vegetative cover with a density of 70 percent of the native background vegetative cover for the area, and no rills or gullies in excess of natural conditions. This assumption does not consider the adequacy of wildlife habitat or livestock grazing goals for rehabilitation, which commonly takes longer to achieve; final stabilization for soils purposes is not the same as returning soil and vegetation to predisturbance conditions. Some existing plant communities likely would not be reestablished to predisturbance structure and density for more than 20 years.
- In areas of low reclamation potential (LRP), timeframes for successful interim and final reclamation of oil and gas well pads and flow lines and access roads are longer, and there is less probability of successful reclamation. The risk of BMP failure is greater on soils rated as moderate or severe for erosion. To be effective on these soils, more extensive reclamation and more aggressive maintenance techniques than those commonly used on soils with a slight erosion hazard are required.
- For purposes of this analysis, it is assumed that erosion rates following surface-disturbing activities return to background levels within 3 to 5 years following full reclamation.
- Soils with a severe hazard rating for erosion experience more adverse impacts from surface-disturbing activities than soils with low or moderate hazard ratings for erosion. Medium- and fine-textured soils are most prone to water erosion and soil compaction when they are wet. Course-textured soils are more prone to wind erosion. Silty-textured soils are prone to both forms of erosion.
- On lands open to minerals entry, surface management operators are governed by reclamation and performance standards focused on preventing unnecessary or undue degradation (43 Code of Federal Regulations [CFR] 3809). An operator is not governed by stipulations that might be imposed for salable or leasable minerals via land use planning decisions, but claimants may voluntarily commit to operating practices in their notice or Plan of Operations submittals. In addition, the Authorized Officer could impose conditions when approving a Plan of Operations. A Plan of Operations is required for exploration that would disturb more than 5 acres, the removal of bulk samples of 1,000 or more tons, or for surface-disturbing activities

more than casual use in special status areas such as designated ACECs and areas closed to cross-country vehicle use; see 43 CFR 3809.11.

- The BLM Emergency Stabilization and Rehabilitation standards in the Department of the Interior (DOI) Interagency Burned Area Emergency Response Guidebook (DOI 2006b) and the BLM Burned Area Emergency Stabilization and Rehabilitation Handbook (BLM 2007d) are implemented for wildland fires to protect and sustain healthy ecosystems and to protect life and property. These standards do not vary by alternative.
- It is assumed that disturbances to soils that have a severe hazard rating for erosion or LRP are distributed across the landscape in the same proportion as the distribution of these soils, unless a proposed management action specifies additional protective measures. In other words, if 5 percent of the soils in the planning area are rated as having a severe potential for erosion, it is assumed that 5 percent of the projected total disturbance would occur on such soils.
- All alternatives include timing and seasonal limitations for surface disturbance and disruption, although Alternative B includes more extensive restrictions than the other alternatives. However, these controlled surface uses (CSUs) do not protect soil over the long term; once the timing restriction has passed, habitat could be disturbed, fragmented, or made unsuitable. Accordingly, differences in timing limitations among the alternatives are not analyzed for impacts to soils.
- The BLM has an MOU with the Fremont County Weed and Pest Department to treat invasive nonnative species (INNS) on public land. This treatment is performed by pedestrians carrying the chemicals in backpacks. There is no surface disturbance associated with this treatment. The funding for this treatment does not vary by alternative and could increase or decrease with BLM budget priorities. In addition, if a particular management action under one of the alternatives, such as protections for groundwater, prohibits implementation of the pesticide program, it is assumed that the treatment would be applied to another location. Treatment funds are the limiting factor, not locations to treat. Therefore, INNS treated acres do not vary by alternative and are not further addressed in this section.
- Although industrial-scale wind-energy development is often viewed as a green alternative to the burning of fossil fuels to generate electricity, in terms of localized impacts to soil, vegetation, wildlife, and water resources, wind-energy development has the largest footprint of surface disturbance per electrical unit generated. Therefore, while industrial wind-energy generation has a beneficial impact on air resources by reducing the generation of GHGs, it requires large amounts of surface disturbance for turbine pads, roads, ancillary facilities, and most importantly, transmission lines to transport the generated electricity to high-demand areas. Therefore, industrial wind-energy generation adversely impacts soil, vegetation, water, and other resources and uses, although it beneficially impacts climate change through the reduction of GHGs.
- Implementing and achieving Wyoming Standards for Healthy Rangelands (Appendix J (p. 1437)) improves vegetation health, vigor, cover, and litter, and minimizes erosion in most areas, with correspondingly beneficial impacts to soil resources.
- Fire suppression and rehabilitation activities also can adversely impact soil resources over the short and long terms. Activities such as firebreak construction, clearing vegetation, and use of heavy equipment would disturb the soil surface and increase erosion over the short term. For example, fire lines constructed during suppression efforts can channelize surface runoff, which can result in gully erosion. Over the long term, however, successful stabilization efforts can increase vegetative cover, and subsequently reduce the natural rate of erosion. Fire suppression and rehabilitation activities do not vary by alternative, and impacts to soil resources would be the same under all alternatives.

- Each of the alternatives varies in the acres open to mineral materials disposals. However, the BLM assumes that the historic demand of 183 acres of disturbance each year would not vary by alternative. Sand and gravel is readily available throughout the planning area, and other sources (whether on private or other public lands) will be available to meet demand. Therefore, impacts to soil resources from mineral materials disposals are not further addressed in this section. Although mineral materials disposals would adversely impact soils, those impacts would not vary by alternative.
- Under all alternatives, 69,276 acres are unavailable for livestock grazing because those acres are unsuitable for that purpose (such as the Sweetwater Rocks, which have no forage), safety reasons such as along highway shoulders, or for other reasons. The number of acres do not vary by alternative and are not further addressed in this section.
- Under all alternatives, soil resources are managed on a case-by-case basis and in accordance with BLM state policies and the Wyoming Stormwater Discharge program requirements for BLM-authorized surface-disturbing activities that fall under this program – currently, surface disturbances of 1 or more acre.
- Surface-disturbing activities associated with minerals and realty development expose soils to increased erosion over the short and long terms. Increases in surface disturbance related to lands and realty actions and minerals development can be expected to result in a proportionate increase in adverse impacts to soils.
- Surface disturbance from locatable minerals entry, mineral materials disposals, and solid minerals leasing is not expected to vary by alternative. Therefore, impacts from these activities are not expected to vary, and these programs are not further addressed in this section.
- Concentrated herbivory that can result from range improvement projects can adversely impact soils when the removal of herbaceous vegetation is excessive and adequate vegetation does not remain to protect the soil resource. This can be a source of soil compaction that reduces infiltration, increases runoff, and hampers reclamation. The alternatives vary in their approaches to range improvement projects.
- All alternatives require management to protect soil resources. This includes analyzing all surface-disturbing activities for suitability of use and impacts; requiring a detailed project-specific reclamation plan; requiring that all suitable topsoil material be salvaged; minimizing project footprints; requiring reclamation plans that identify the plant community for each phase of reclamation for long-term disturbances; and requiring monitoring by the operator to determine reclamation success. These types of BMPs would result in the same beneficial impacts to soil resources under all alternatives, and are not further addressed in this section.
- All alternatives manage Wilderness Study Areas (WSAs) in accordance with the Interim Guidance. This management would beneficially impact soils because most surface-disturbing activities would be prohibited in WSAs. However, adverse impacts to soils could result if there is a wildfire in a WSA, because fire suppression would not be allowed. Because WSA management is the same under all alternatives (except for minor differences in travel management), impacts to soils would not vary by alternative. Accordingly, WSAs are not be further addressed in this section.

4.1.3.3. Detailed Analysis of Alternatives

4.1.3.3.1. Impacts Common to All Alternatives

Soils on BLM-administered surface lands and federal mineral estate could be disturbed under each alternative by activities proposed across a variety of resource programs. Adverse impacts to soils associated with these disturbances are predicted under each alternative, although the intensity of the impacts would vary across alternatives. Appendix T (p. 1535) lists projected surface disturbance by alternative during the planning period.

INNS that form monoculture stands, such as leafy spurge and Russian knapweed, can acerbate erosion through reduced vegetative cover. The same is true of infestations of annual weeds like cheatgrass and halogeton. The presence of INNS can alter natural fire regimes to the point that increased fire frequency leads to accelerated soil erosion. Some annual weeds can have a short-term beneficial impact because they can serve as a nurse crop, although a poor one, to give a limited degree of erosion protection while species planted for reclamation establish. INNS treatment does not vary by alternative.

Various methods would be utilized to minimize impacts to soil resources under all alternatives. BMPs, watershed enhancement projects, conservation practices, Storm Water Discharge Plans, Weed Management Area Plans, project-specific soil investigations, and reclamation plans are designed to reduce impacts to soil. While these practices and actions would not result in an actual beneficial impact to soils, they can result in more successful reclamation, reduce impacts during the time the soil is bare, and reduced runoff, soil erosion, and sediment yield. Limiting motorized vehicle use to existing roads and trails would prevent route proliferation and vegetation removal that could increase erosion. In addition, management actions that restore plant communities, particularly to the extent historic disturbance is reclaimed, enhance soil resources by restoring infiltration, organic matter content, and productivity, and reducing erosion. Impacts from surface-disturbing and disruptive activities are mitigated through the application of the Wyoming BLM Standard Mitigation Guidelines for Surface-Disturbing and Disruptive Activities (Appendix M (p. 1489)).

The standard statewide stipulation that prohibits surface-disturbing activities during periods when soil is frozen, or saturated, or when watershed damage is likely to occur is applied under all alternatives. This prohibition would protect soil resources and would not vary by alternative.

Fuels management is generally the same under all alternatives, although the acres of treatment would vary by alternative. Acres treated depend on available funds to pay for treatment, which varies depending on the amount of funds used on range improvements. No long-term surface disturbance or associated erosion is anticipated from prescribed fire, or chemical or mechanical fuels treatments following reclamation. Fuels management could have an adverse short-term impact and a beneficial long-term impact on soil resources. Soil-disturbing vegetative treatment projects under all alternatives would result in short-term increases in erosion, but these should be ameliorated over the short to long terms as treated sites reestablish vegetation, and would have a long-term beneficial impact to soils.

Forest product sales are expected to be uniform across the alternatives. Although Alternative A manages forest product sales with board-feet restrictions in certain areas, demand for forest products is anticipated to be so low that board-feet forest restrictions would not be likely to result in different impacts by alternative. Similarly, although Alternative C has the fewest restrictions on forest management, including the use of silviculture techniques such as clear-cuts, this management would depend on market demand for timber products. With all alternatives assuming a flat demand regardless of management prescriptions, there would be no differences in impacts to soil resources from forest products management among the alternatives.

Fire in the planning area can impact soils over the short term by removing vegetation and exposing soils to water and wind erosion. Under certain conditions, hot fires can create hydrophobic soil conditions (i.e., resistance to water infiltration), whereby runoff and erosion are increased. Over the long term, however, provided that vegetative recovery is successful, fire can have a beneficial impact on soil resources by improving land health and reducing erosion and the risk of landscape-level fire. In general, fire management does not vary by alternative, particularly in light of evidence that full suppression of wildland fire and avoiding planned fire in greater sage-grouse habitat might be appropriate. On a site-specific basis, impacts from fire management could vary by alternative, but on a planning area basis, differences are too speculative to be further analyzed.

All alternatives manage soils and grassland and shrubland communities to meet Wyoming Standards for Healthy Rangelands. The standards are utilized to protect and improve rangeland health and are generally effective in managing impacts to soils from livestock grazing. The differences between favoring production more oriented toward wildlife than livestock would not lead to different impacts to soils as a result of management emphasis unless the management action prevents achieving Wyoming Standards for Healthy Rangelands.

Riparian-wetland areas are to be managed to meet or exceed proper functioning condition (PFC) and Wyoming Standards for Healthy Rangelands. This can involve rest or deferment from grazing pressure, fencing projects, structural in-stream projects, or any combination thereof. Fencing and in-stream structural placement will necessarily disturb soil over the short term, and an increase in erosion over natural levels; however, over the long term, erosion rates should return to natural levels. In addition, when riparian-wetland areas do not meet Wyoming Standards for Healthy Rangelands, it is usually because a degraded condition is accelerating erosion.

Impacts to soil resources from wild horses are similar to impacts from livestock, because wild horses prefer to eat grasses and visit water projects and riparian-wetland zones for water. Horses can compact soils, cave stream banks, and denude areas near water or salt licks or trails, and can spread INNS that can adversely impact soils if they become established. However, wild horses travel more widely than livestock in the course of a day and do not generally loiter in riparian-wetland areas. This tends to spread their impacts over a larger area and dilute the overall effect, although they can cause localized adverse impacts to soils.

Management of wild horses necessarily involves periodic roundups using light-duty trucks, trailers, heavy duty-trucks, aircraft, and entrapment locations. Some of these activities create short-term surface disturbance, usually less than 1 acre of total disturbance. However, horse roundups are infrequent and do not occur at the same location for several years and at some locations only once. These gather locations are upland sites that are expected to recover well over the short to long term.

The acreage of WSAs (55,338 acres) is the same under all alternatives, and all alternatives prohibit surface-disturbing activities in those areas.

All alternatives include actions that restrict surface disturbance in the planning area, and those restrictions generally would have a beneficial impact on soil resources. For example, withdrawals that close areas to surface-disturbing activities, or requirements for construction, operation, monitoring, and rehabilitation planning before surface-disturbing activities are initiated would, at a minimum, reduce the potential for adverse impacts to soils from surface-disturbing activities.

Under all alternatives, INNS are managed on a case-by-case basis. Vegetative treatments, including INNS control, would reduce adverse impacts to soil from INNS spread. The amount of vegetative treatment, including INNS control, vary by alternative. INNS infestations can lead to accelerated erosion and loss of soil fertility.

The Westwide Corridor in the northeast section of the planning area was established as part of a Programmatic Environmental Impact Statement (EIS) and is common to all alternatives. Impacts to soils would not vary by alternative, and this designated corridor is not further addressed in this section.

4.1.3.3.2. Alternative A

4.1.3.3.2.1. Program Management

Alternative A allows surface-disturbing activities in LRP areas with mitigation on a project-by-project basis using a detailed site analysis and reclamation objectives. Alternative A manages mineral and realty actions in these areas with CSU restrictions. In addition, Alternative A avoids surface disturbance on LRP soils whenever possible. See Map 11 for identified LRP soils.

Alternative A applies the standard statewide stipulations (see Appendix M (p. 1489)) that prohibit surface-disturbing activities during periods when soil is frozen or saturated, or when watershed damage would be likely, and restricts surface occupancy on slopes equal to or greater than 25 percent. See Table 2.3, “Comparative Summary of Proposed Land Use Decisions in the Lander Planning Area” (p. 32) for the number of acres associated with these restrictions that benefit soils. Under Alternative A, as opportunities arise, areas of past soil disturbance that have not been successfully reclaimed would be identified and project-specific reclamation plans developed; this would beneficially impact soil resources.

4.1.3.3.2.2. Resources

Alternative A air quality management would result in slightly adverse impacts to soil resources because degradation of existing air quality would be allowed to continue as long as federal air quality standards (adopted by the State of Wyoming) were not exceeded. Restrictive air quality management would impose PM_{10} limits that could be achieved, in part, by limiting surface disturbance. Alternative A water resource management would neither benefit nor adversely impact soil resources. Unlike Alternative B, which manages the Little Red Creek Complex near Whiskey Mountain as non-WSA land with wilderness characteristics, Alternative A does not specifically manage these lands for wilderness characteristics. However, the portion of the Little Red Creek Complex in the Whiskey Mountain ACEC is managed in accordance with ACEC-specific management which provides additional resource protections. For the non-ACEC portion of the WSA, travel management is limited to existing roads and trails, with no beneficial impact to soil resources.

Alternative A limits surface disturbance within 500 feet of surface water and riparian-wetland areas, which would beneficially impact soil resources in those areas. Alternative A INNS management does not require livestock flushing to prevent the spread of INNS; this would adversely impact soil resources.

Management actions under Alternative A designed to protect wildlife and special status species habitat from the adverse impacts of surface-disturbing and disruptive activities also would protect soil resources from these adverse impacts. While timing limitations would not beneficially impact soils, some wildlife protections (e.g., closing the area within ¼ mile of greater sage-grouse leks) would beneficially impact soil resources in those areas. On a case-by-case basis, Alternative

A closes and reclaims unnecessary roads and old minerals exploration trails, which would beneficially impact soil resources.

The limited management prescriptions under Alternative A designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and disruptive activities also would protect soil resources from these activities (see sections specific to those resources).

4.1.3.3.2.3. Resource Uses

Alternative A authorizes surface-disturbing activities under the minerals and ROW programs. Appendix T (p. 1535) lists the projected acreage of surface disturbance by activity. Alternative A would result in 52,591 acres of short-term and 12,439 acres of long-term surface disturbance. Long-term disturbance would not necessarily adversely impact other resources such as water or air. Soil permanently disturbed because it supports a wind turbine, for example, would not support vegetation, but also would not contribute to sedimentation of waterways.

Alternative A does not designate any ROW corridors (other than the Westwide Corridor common to all alternatives). Alternative A co-locates future ROWs in existing ROWs where possible. Alternative A identifies a limited amount of public surface as ROW avoidance areas and ROW exclusion areas. The data in Appendix T (p. 1535) for ROW disturbance are based on historic trends, which are expected to continue into the future.

Alternative A opens most of the planning area to livestock grazing and allows range improvement projects. Appendix T (p. 1535) lists the projected long-term surface disturbance associated with range improvement projects during the planning period. Concentrated herbivory can result in adverse impacts when the removal of herbaceous vegetation is excessive and adequate vegetation does not remain to protect soil resources. Concentrated herbivory can compact soil and reduce infiltration, increase runoff, and hamper reclamation. Livestock grazing management under Alternative A provides for the protection or enhancement of resource values, which would beneficially impact soils. Alternative A prohibits the placement of salt or mineral supplements within ¼ mile of water, riparian-wetland areas, and reclaimed or reforested areas, which would reduce vegetation removal and soil compaction from concentrated livestock grazing and traffic.

Alternative A addresses problems with rangeland health through a variety of livestock grazing management approaches, including fenced riparian-wetland exclosures and pastures, short-term rest, and grazing strategies that favor riparian-wetland enhancement. This alternative allows rangeland improvement projects, including spring development, pipeline development, reservoir/pit development, fence development, well development, and reservoir maintenance, on a case-by-case basis. Such projects are predicted to result in surface disturbance of 860 acres during the planning period, or approximately 43 acres per year. Rangeland improvement projects can result in short-term accelerated erosion from fence installation or livestock walking on the surface, but these adverse impacts would be offset by improvements to soil resources.

Under Alternative A, revegetation is expected to occur within several growing seasons. Long-term erosion rates should return to normal as upland sites farther from water are reclaimed to an appropriate percentage of ground cover that would be expected for the historic plant community for a given site. However, unprotected water developments subject to improper livestock grazing management would typically become denuded of vegetation and subject to accelerated erosion. Soil compaction, reduced infiltration, increased surface water runoff, and trail formation can occur in these upland to wet lowland (or water development) transition zones. This can compound the localized soil degradation usually found near uncontrolled water sources by channeling upland runoff in the transition zones down to the lowlands.

Recreation-related adverse impacts to soil resources, such as soil compaction, soil particle detachment, dust evolution, and increased vulnerability to water and wind erosion, can occur from authorized large-group activities, the repeated use of undeveloped campsites, and cross-country mechanized (bicycle) travel. See Table 2.3, “Comparative Summary of Proposed Land Use Decisions in the Lander Planning Area” (p. 32) for the number of acres closed to motorized travel and over-snow vehicles under Alternative A. Seasonal closures would protect soil resources during times when adverse impacts could occur.

4.1.3.3.2.4. Special Designations

Alternative A manages nine waterbodies (9,919 acres) identified as eligible for inclusion in the National Wild and Scenic River System (NWSRS) for their outstanding remarkable values (ORVs) by limiting surface-disturbing activities within ¼ mile of these waterbodies; this would beneficially impact soils in that buffer.

Alternative A places moderate to major constraints on surface-disturbing and disruptive activities in certain special designation areas where surface disturbance is minimized. Alternative A designates 119,622 acres as ACECs; this would trigger the requirement for Plans of Operation for surface-disturbing activities greater than casual use. This provides the BLM with a tool to help avoid adverse impacts to soil resources, particularly during exploration. Alternative A avoids seven of the nine ACECs for ROWs. ROW avoidance protects soil resources and prevents the adverse impacts associated with ROW surface disturbances. Alternative A ROW management in those seven ACECs recognizes that soils and vegetation are part of the values supporting ACEC designation, whether because the soils themselves are sensitive (Dubois Badlands), because they contribute to a viewshed (Red Canyon), or because the soils support vegetation critical to protected wildlife (Whiskey Mountain). Alternative A manages surface disturbance in the two ACECs not avoided for ROWs (Green Mountain and Beaver Rim) to protect identified values of concern, which would beneficially impact soil resources in those areas.

4.1.3.3.3. Alternative B

4.1.3.3.3.1. Program Management

Management actions under Alternative B prohibits surface-disturbing and disruptive activities in LRP areas, which would be more protective of soil resources than Alternative A. The risk of rehabilitation failure, and often soil strength issues, for roads and work locations in sandy soils is greatest in LRP soils. Standard operating procedures and BMPs typically do not work well, and additional measures must be employed to limit soil erosion and comply with Clean Water Act (CWA) Stormwater Discharge program requirements. The risk of BMP failure is greater in LRP areas. Impacts to soil resources under Alternative B would be more beneficial than impacts under Alternative A because Alternative B limits surface disturbances to soils that have the best potential for rehabilitation after disturbance.

Alternative B prohibits surface-disturbing activities on slopes in excess of 15 percent, where the potential for erosion is greater than on slopes less steep. Alternative B would beneficially impact soil resources because it limits surface disturbance to slopes less prone to experience high erosion rates and losses of soil fertility, and more easily stabilized and rehabilitated after disturbance. Alternative B protects far more acres from surface disturbance than Alternative A.

In addition, Alternative B requires a thorough inventory of areas with disturbed soils that have not been successfully reclaimed, and requires those areas be prioritized for reclamation. Compared to Alternative A, this would beneficially impact soil resources because soil erosion and fertility losses would eventually cease in these disturbed areas and productivity would be restored to the historic plant community for each site. Alternative A takes a less comprehensive, indirect approach to identifying unsuccessful reclamation and would not protect these areas from the adverse impacts of accelerated erosion as well as Alternative B.

4.1.3.3.3.2. Resources

Alternative B management prohibits motorized and mechanized travel in lands with wilderness characteristics managed as non-WSA lands with wilderness characteristics which would protect soil resources in these areas. Alternative A does not specially manage these lands; therefore, Alternative B would result in more beneficial impacts to soil resources in these areas. In addition, Alternative B management of the Little Red Creek Complex could reduce the demand for its use for motorized access to other lands, which would beneficially impact soil resources in that area. Alternative B management of forest products is more restrictive than Alternative A; however, this management would not be likely to result in a substantial beneficial impact to soil resources because commercial demand for forest products is expected to be depressed during the planning period.

Alternative B INNS management is more aggressive than Alternative A, and includes livestock flushing when appropriate; this would beneficially impact soils more than Alternative A.

Alternative B riparian-wetland resources management prohibits surface-disturbing activities within 1,320 feet of surface water, riparian-wetland areas, playas, and 100-year floodplains, where mapped. This wide buffer, coupled with the slope restrictions on surface use, would protect soil resources from surface disturbance and resulting erosion, and result in more beneficial impacts to soil resources than Alternative A. Alternative B protects more than double the acres in riparian-wetland areas and transition zones than Alternative A.

Under Alternative B, the BLM would construct and upgrade a wild-horse viewing loop road, which would beneficially impact soils in that area. This road would be built to BLM Manual 9113, Roads (BLM 1985), design specifications and likely be surfaced with crushed rock or asphalt. The road would likely be from 10 to 20 miles long to accommodate sightseeing tourists and weekend traffic. Short-term adverse impacts would include increased erosion in the area of construction, but as cut-and-fill slopes were rehabilitated, long-term impacts from erosion should be negligible. While Alternative B would increase visitation for wild-horse viewing, which would increase the potential for INNS introduction, improving the existing road would beneficially impact soil resources compared to the use of unimproved roads under Alternative A.

Management actions under Alternative B designed to protect wildlife and special status species habitat from the adverse impacts of surface-disturbing and disruptive activities also would protect soil resources from these activities. Alternative B increases the areas closed to surface-disturbing activities for the protection of wildlife. While this management action would not affect areas already leased, if the leases expire, the area would not be re-leased. Closing greater sage-grouse

Core Area to leasing would avoid surface disturbances associated with oil and gas development, which would result in a substantial beneficial impact to soil resources compared to Alternative A.

Alternative B also would beneficially impact soil resources by systematically inventorying and closing unnecessary roads and trails and prescribing rehabilitation for them. This would result in a greater beneficial impact to soil resources than Alternative A, which applies this management action on a case-by-case basis.

Management prescriptions under Alternative B designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and disruptive activities also would protect soil resources from these activities and from the undesirable impacts associated with accelerated erosion. Generally, Alternative B would provide the greatest secondary protections to soil resources by taking a more proactive approach to resource protection.

4.1.3.3.3.3. Resource Uses

Appendix T (p. 1535) identifies the projected surface disturbance from oil and gas development. Surface disturbance from oil and gas operations under Alternative B would be moderately less than under Alternative A. This would beneficially impact soils.

Alternative B makes far fewer acres available for wind-energy development than Alternative A; see Appendix T (p. 1535). This management would reduce surface disturbance and adverse impacts to soil. In addition to the actual footprints of the wind-energy structures and related facilities, there would be increased soil disturbance from additional roads and transmission lines associated with such development. Alternative B will protect more land from surface disturbances that would provide opportunities for the introduction of INNS than Alternative A.

Alternative B confines future major ROWs to designated corridors, currently 15,364 acres. This is a very small area designated for future major ROWs in comparison to Alternative A. Alternative B also includes 315,219 acres of ROW avoidance areas and 1,919,029 acres of exclusions areas. Less disturbance related to ROW development would result in fewer adverse impacts to soil resources.

Alternative B authorizes livestock grazing on 2,312,095 acres, 12,839 fewer acres than Alternative A. A more important difference in impacts to soil resources from livestock grazing between alternatives A and B arises from the limitation on construction of new rangeland developments. Alternative B limits new developments to areas where there are no conflicts with other resources, which is much more restrictive than Alternative A and avoids the surface disturbance associated with rangeland improvements and related livestock concentration. While fencing can protect riparian-wetland resources, which also would benefit soil resources, fences and other developments could result in adverse impacts from livestock concentration.

Under Alternative B, the BLM takes a passive-management oriented, non-project development approach to correcting identified PFC and Wyoming Standards for Healthy Rangelands deficiencies, rather than authorizing range improvement projects to improve conditions. This approach could benefit soil resources on low slopes without compacted soils in moist locations. These would recover over the short to long terms. However, this might not benefit soil resources as quickly as management under Alternative A, which authorizes the use of range improvement projects to rehabilitate or enhance riparian-wetland areas, which could yield desirable results sooner, depending on degradation at a specific site. However, there are tradeoffs in using range improvement projects; fencing could protect riparian-wetland resources, but fences could adversely impact soils in other areas. See the discussion under Alternative A.

In addition, Alternative B prohibits the placement of salt or mineral supplements on many more acres than Alternative A, which would result in more beneficial impacts to soil resources. These limitations would reduce vegetation removal, soil compaction, runoff, and the risk of accelerated erosion from concentrated livestock grazing and traffic. Alternative B also provides for the establishment of forage reserves as opportunities arise. This approach would result in the fewest adverse impacts to soil resources from range improvement projects over the short and long terms.

Alternative B would result in more beneficial impacts to soil resources than Alternative A because Alternative B livestock grazing management allows only light utilization. Alternative A establishes forage utilization levels for livestock grazing on a case-by-case basis, which would result in adverse impacts to soil through compaction, loss of vegetation (which would result in higher erosion and less infiltration), and loss of vegetative diversity.

Alternative B closes 71,761 acres to motorized travel, 12.1 times more acres than Alternative A. Alternative B seasonally closes slightly more acres to motorized travel than Alternative A, and limits motorized travel to designated roads and trails on slightly more acres than Alternative A. Far more acres (181,173) are closed to over-snow vehicle use and over-snow travel is limited to conditions with at least 12 inches of snow. Otherwise, over-snow vehicle use would be considered the same as any other kind of motorized travel, which would be limited to existing (or designated, where appropriate) roads. In this regard, Alternative B would result in more substantial beneficial impacts to soil resources because cross-country travel by over-snow vehicles can damage vegetation and soil resources if the ground is not protected by a depth of snow. More restrictive travel, in general, under Alternative B would result in fewer adverse impacts from accelerated erosion than under Alternative A.

4.1.3.3.3.4. Special Designations

Alternative B closes all WSAs to motorized and mechanized travel. This management would beneficially impact soil resources by minimizing soil erosion in these areas. Alternative A does not close most WSAs to motorized travel.

Wild and Scenic River (WSR) management under Alternative B would result in impacts the same as Alternative A. From a practical standpoint, WSR classification would not provide additional beneficial impacts to soil resources because the Sweetwater Canyon WSR is within the WSA, where surface disturbance is limited and soil resources are protected.

Alternative B designates a total of 1,492,990 acres of ACECs, and applies moderate to severe constraints on surface-disturbing activities in ACECs and requires Plans of Operation. These protections are extended to approximately 12.5 times more acreage than Alternative A, and therefore result in substantially more beneficial impacts to soil resources than Alternative A.

4.1.3.3.4. Alternative C

4.1.3.3.4.1. Program Management

Soils program management under Alternative C is similar to management under Alternative A. There would be more adverse impacts to soil resources under Alternative C than under Alternative

A, and substantially more than under Alternative B. While Alternative A includes more CSU limitations than Alternative C, which applies only standard stipulations, in most cases these additional restrictions would result in very few beneficial impacts to soil resources except in special designations areas. Like Alternative A, Alternative C avoids surface disturbance on slopes equal to or greater than 25 percent, which is much less restrictive than Alternative B.

4.1.3.3.4.2. Resources

Management actions for air and water resources under Alternative C are similar to those under Alternative A and less restrictive than under Alternative B; see Alternative B for the comparison of impacts to soil resources between alternatives A and B. The Alternative B limitation on surface disturbance in water recharge areas or sole-source aquifers would be more protective of soil resources than Alternative C, which, like Alternative A, does not include similar protections.

Alternative C does not specially manage lands with wilderness characteristics, including lands in the Little Red Creek Complex near Dubois. Therefore, Alternative C would result in more adverse impacts to those lands and their soil resources than Alternative A or B.

Alternative C emphasizes the use of structural projects to make progress toward PFC and Wyoming Standards for Healthy Rangelands, whereas Alternative B relies on passive solutions and Alternative A uses a mix of approaches. This is further discussed under livestock grazing.

INNS management prescriptions under Alternative C are the same as those under Alternative A, which is less proactive than Alternative B and therefore less effective at controlling erosion related to INNS infestations. Alternative C includes substantially more surface disturbance associated with oil and gas production than Alternative B, and somewhat more than Alternative A, with associated adverse impacts to soil resources.

Alternative C riparian-wetland management actions are very similar to those under Alternative A, except in cases where it can be shown that equivalent riparian-wetland protections could be achieved using a shorter buffer distance (within the 500-foot buffer). This buffer would afford some protection for native plant communities from potential soil compaction and accelerated erosion over the short and long terms, but would not protect native plant communities as well as Alternative A or B, although the difference between alternatives A and C would be minor.

Alternative C wildlife management is generally the same as management under Alternative A regarding wildlife protections, including protections for greater sage-grouse leks. Alternative C does not close and reclaim unnecessary roads and old mineral exploration trails, unlike Alternative A, which does so on a case-by-case basis, and Alternative B, which more actively identifies and rehabilitates redundant and hazardous roads. The difference in adverse impacts to soils between alternatives A and C would be minor.

Management prescriptions under Alternative C designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and disruptive activities also would protect soil resources from the impacts of these activities.

4.1.3.3.4.3. Resource Uses

Surface-disturbing activities associated with mineral development expose soils to increased erosion potential over the short and long terms (for projected acres of disturbance under Alternative C, see Appendix T (p. 1535)). Alternative C increases the amount and severity of surface disturbances related to minerals development (leasable and locatable minerals, mineral materials disposals, and geothermal leasing) substantially compared to alternatives A and B, which would be expected to result in a proportionate increase in adverse impacts to soil from compaction and accelerated erosion. This would be particularly true for soil resources in greater sage-grouse Core Area, which Alternative B closes to oil and gas leasing.

See Table 2.3, “Comparative Summary of Proposed Land Use Decisions in the Lander Planning Area” (p. 32) for acres open, avoided, or excluded for industrial wind-energy development under Alternative C. Alternative C opens many more acreage to wind-energy development than Alternative B, and slightly more than Alternative A. In addition to the actual footprints of wind-energy structures and related facilities, there would be more surface disturbance and risk of accelerated erosion from additional roads and power transmission corridors associated with such development. The differences among the alternatives are less substantial when the analysis is limited to areas that have commercial wind-energy potential. Alternative C protects less land from surface disturbances than Alternative A, and much less land than Alternative B.

Alternative C ROW management would result in substantially more adverse impacts to soil resources because the alternative opens much more area to surface disturbance than Alternative A or B. Alternative C makes the most land available for ROWs and includes the fewest acres of ROW exclusion and avoidance areas compared to alternatives A and B. Because it allows the most surface disturbance, Alternative C would result in greatest impacts to soil resources from soil compaction and accelerated erosion.

Alternative C opens the same amount of the planning area to livestock grazing as Alternative A. Alternative C allows moderate grazing (41 to 60 percent) rather than setting utilization levels on a case-by-case basis, as does Alternative A, or by prescribing light (20 to 40 percent) utilization levels, as does Alternative B. This higher (moderate) utilization would necessitate more monitoring and leave less room for error than light utilization, risk greater adverse impacts to the plant community because it would increase soil compaction in livestock concentration areas, and accelerate erosion from the removal of vegetation below the threshold at which a particular site would experience adverse impacts. New range improvement projects under Alternative C would disturb the most areas of any alternative.

Alternative C emphasizes the use of structural projects and comprehensive grazing strategies to make progress toward PFC and Wyoming Standards for Healthy Rangelands that would, if properly applied, yield the fastest results in riparian-wetlands improvement, and therefore beneficially impact soils. However, project work is expensive, planning typically requires more than 2 years, monitoring and repair of structures are more intensive than passive management, and funds for such improvements are not always available. Moreover, while improved riparian-wetland health can benefit soil resources, livestock concentration areas associated with range developments would adversely impact soil. These impacts could exceed the beneficial impacts to soils from riparian-wetland improvement.

Alternative C includes the same management for the placement of salt or mineral supplements as Alternative A, thus protecting the same areas from adverse impacts to soil resources, but fewer areas than Alternative B.

Roads and trails are prime locales for soil compaction and accelerated erosion and the fewer acres open to traffic, the fewer chances for damage to soil resources. Alternative C closes far fewer (5,472) acres to motorized travel than under Alternative B and slightly less than the acres closed under Alternative A. Alternative C limits motorized travel to designated roads and trails on only about a quarter of the roads of either Alternative A or B. While Alternative C travel management is less protective of soil resources than Alternative A or B, Alternative C, like all alternatives, does prohibit cross-country vehicular traffic, which would protect large areas without roads from the adverse impacts of cross-country travel.

There would be no acres seasonally closed to motorized travel under Alternative C or other limits on over-snow travel, which would adversely impact soils by allowing travel at times when soils are wet and most susceptible to damage. This would be more adverse to soil resources than either Alternative A or B. Alternative C is the least restrictive for motorized travel in the planning area, and would allow the most opportunities for adverse impacts from soil compaction and accelerated erosion.

4.1.3.3.4.4. Special Designations

Alternative C manages Congressionally Designated Trails the same as Alternative A, with the same limited protection of soils in a ¼-mile buffer along the Congressionally Designated Historic Trails and no protections for the Continental Divide National Scenic Trail (CDNST).

WSA management under Alternative C is the same as Alternative A, which does not close most WSAs to motorized travel. The impacts to soil resources under Alternative C would be similar to impacts under Alternative A, and more adverse than under Alternative B, which closes all WSAs to motorized travel.

Alternative C does not manage any waterways to maintain their suitability for inclusion in the NWSRS; so therefore, there are no protections for the soils in the ¼-mile buffer applied to designated sections. This would have a minor adverse impact to soils compared to alternatives A and B.

Alternative C does not designate ACECs; therefore, it limits surface management to standard statewide stipulations. This would result in more adverse impacts to soil resources than Alternative A or B, and compared to Alternative B, much greater adverse impacts. The ACEC designations under alternatives A and B require submittal of Plans of Operation for surface-disturbing activities greater than casual use, and some ACEC designations limit surface occupancy and surface disturbance. These measures would decrease the likelihood of adverse impacts to soil resources from surface-disturbing activities and INNS over the short and long terms best under Alternative B, and less under Alternative A. Alternative C does not provide similar protections.

4.1.3.3.5. Alternative D

4.1.3.3.5.1. Program Management

Soils program management under Alternative D is generally similar to management under Alternative B, but would result in more adverse impacts to soil resources than Alternative B. Alternative D would result in substantially fewer adverse impacts to soil resources than alternatives A and C.

4.1.3.3.5.2. Resources

Management actions for air and water resources under Alternative D are similar to those under Alternative A and less restrictive than those under Alternative B, and would result in the same minor adverse impacts to soil resources. Alternative D management of surface disturbance in water recharge areas or sole-source aquifers is the same as Alternative B and more protective of soil resources than alternatives A and C.

Alternative D manages slightly fewer acres of the Little Red Creek Complex as non-WSA lands with wilderness characteristics than Alternative B. This management would result in essentially the same beneficial impacts to soils as Alternative B, considerably more than Alternative C, and slightly more than Alternative A.

Management of forest product sales and forests and woodlands under Alternative D only limits silviculture techniques as needed to protect resources. This would likely result in more beneficial impacts to water than alternatives A and C, which include artificial slope and riparian-wetland limitations, regardless of impacts. While the more restrictive management under Alternative B would result in more short-term beneficial impacts, over the long term, the limits on silviculture techniques under Alternative B would be likely to result in more adverse impacts because no commercial thinning or fuels reductions would be likely. However, as previously stated, the actual impacts to soil resources would not vary substantially by alternative because of depressed demand for forest products.

INNS management prescriptions under Alternative D are the same as under Alternative B. Compared to alternatives A and C, Alternative D takes a more proactive approach to INNS management, such as flushing livestock and adjusting terms and conditions of authorized activities to help control INNS. This management would benefit soils because it would help prevent erosion related to INNS infestations. Moreover, Alternative D involves the second lowest amount of surface disturbance and second greatest management focus on reducing duplicative roads after Alternative B. The best indicator of INNS infestation potential is the amount of surface disturbance and roads.

Riparian-wetlands management under Alternative D applies the same riparian-wetlands buffer as Alternative A and would result in similar beneficial impacts to soil resources. This buffer will afford some protection to native plant communities from potential soil compaction and accelerated erosion over the short and long terms, but not as much protection as Alternative B. The Alternative D management approach for riparian-wetlands relates to livestock grazing management; impacts to soil resources are addressed in the discussion below under *Resource Uses* for grazing management.

Alternative D is similar to Alternative B in its wildlife protections, including greater sage-grouse lek protections, except that Alternative D is less protective, particularly outside Core Area and regarding solid minerals leasing. Alternative D wildlife management is more protective of soil resources than Alternative A, and considerably more protective than Alternative C, because Alternative D closes much more area to surface disturbance.

Management prescriptions under Alternative D designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and disruptive activities also would protect soil resources from these activities. See resource-specific sections for the prescriptions. Generally, Alternative D provides the second most secondary protections against INNS invasion and erosion, preceded by Alternative B and followed by Alternative A and then Alternative C.

4.1.3.3.5.3. Resource Uses

Surface-disturbing activities associated with minerals development expose soils to increased erosion potential and INNS invasion over the short and long terms (for projected acres of disturbance under Alternative D, see Appendix T (p. 1535)). Alternative D decreases the amount and severity of surface disturbance related to minerals development (leasable minerals, locatable minerals, mineral materials disposals, and geothermal leasing) substantially compared to alternatives A and C. This would be expected to result in a proportionate decrease in risk of adverse impacts to soil (e.g., compaction and accelerated erosion), secondarily leading to adverse impacts to water. Alternative D would result in fewer beneficial impacts than Alternative B because Alternative D it applies fewer major constraints to oil and gas leasing. This would be particularly true for soil resources outside greater sage-grouse Core Area.

See Table 2.3, "Comparative Summary of Proposed Land Use Decisions in the Lander Planning Area" (p. 32) for acres open, avoided, or excluded from industrial wind-energy development under Alternative D. Wind-energy development adversely impacts soil and water resources on the actual footprint of the wind-energy structures and related facilities, and through increased surface disturbance and risk of accelerated erosion from additional roads and power transmission corridors associated with such development. The difference in impacts among the alternatives is less substantial when the analysis is limited to areas with potential for commercial wind-energy development. All permitted activities in excess of 1 acre are required to comply with the Wyoming storm water management program, which would help limit adverse impacts to soil resources from surface disturbance.

Alternative D ROW management is similar to Alternative B, although Alternative D designates more corridors and the corridors are wider than those Alternative B designates. Designating corridors would beneficially impact soils, and therefore water resources, because designation would increase the likelihood that ROWs would be co-located. However, Alternative B would result in more beneficial impacts than any of the other alternatives because it closes areas not designated as corridors to major ROWs; all other alternatives consider authorizing ROWs outside designated corridors. Alternative D results in beneficial impacts to soil resources very similar to Alternative B because, although major ROWs are considered outside of the designated ROW corridors, Alternative D puts the burden of justifying new locations on the ROW proponent; this may limit new surface disturbance.

Alternative D is similar to the other alternatives in authorizing livestock grazing in approximately 97 percent of the planning area. Like Alternative C, Alternative D allows moderate grazing (41 to 60 percent) utilization rather than setting utilization levels on a case-by-case basis, as does Alternative A, or by prescribing light (20 to 40 percent) utilization levels, as does Alternative B. This higher utilization would necessitate more monitoring and leave less room for error than light utilization, risk greater adverse impacts to the plant community because it would increase soil compaction in livestock concentration areas, and accelerate erosion from the removal of vegetation below the threshold at which a particular ecological site would experience adverse impacts.

Alternative D uses salt and mineral supplements for livestock similar to Alternative B, and would result in more beneficial impacts to soil resources than alternatives A and C. Alternative D allows the use of structural projects to make progress toward PFC and Wyoming Standards for Healthy Rangelands only pursuant to a Comprehensive Grazing Strategy. This would result in beneficial impacts to soil resources by avoiding surface disturbance associated with range improvement projects and limiting livestock concentration areas. Alternative D riparian-wetlands management provides for more flexibility than Alternative C; if properly applied, this would yield the most expedient results in riparian-wetlands improvement. However, project work is expensive, planning typically requires more than 2 years, monitoring and repair of structures are more intensive than passive management, and funds for such improvements are not always available, especially because current BLM budget projections call for decreasing budgets for the next several years. While improved riparian-wetland health can benefit soil resources, livestock concentration areas associated with range developments would adversely impact soil. These impacts could exceed the beneficial impacts to soils from riparian-wetland improvement.

Roads and trails are prime locations for soil compaction and accelerated erosion, and the fewer acres open to traffic, the less chance for damage to soil resources. Alternative D closes the second most acres to motorized travel so is the second most beneficial to soil resources. Alternatives B and D both treat over-snow vehicle use in areas with less than 12 inches of snow coverage the same as any other motorized vehicle use, and limit travel to existing or designated roads. This management would protect vegetation and soil resources, and would result in substantial beneficial impacts in compared to alternatives A and C.

4.1.3.3.5.4. Special Designations

Alternative D management of Congressionally Designated Trails would result in more beneficial impacts to soil resources than Alternative A, substantially more than Alternative C, but substantially less than Alternative B, because of limits on surface disturbance in connection with trails. However, the actual number of acres protected from surface disturbance under any alternative is difficult to calculate because closure depends on visual resource management (VRM) considerations such as distance from the trails and topography.

Alternative D WSR management would be moderately less beneficial to soils than management under Alternative A by limiting surface disturbance in much less area. However, some of the protected waterways under alternatives A and B are in ACECs, such as the Lander Slope, or a WSA under Alternative D, so adverse impacts to soils, even in the areas around unprotected waterways are likely to be minimal.

Alternative D designates 245,037 acres of ACECs that have surface disturbance limitations as part of the protection of ACEC values, and requires Plans of Operation for locatable minerals operations, which would cause surface disturbances greater than casual use. These measures under Alternative D would decrease the likelihood of adverse impacts to soil resources due to surface-disturbing activities and INNS over the short and long terms, followed by Alternative A; Alternative C affords no similar protections.

4.1.4. Water

This section analyzes impacts to surface water and groundwater quality and quantity from management actions under the alternatives. There is considerable overlap between surface water and groundwater, and adverse impacts to one would likely have a similar impact on the other, although to a different degree. In addition, there is a relationship between soil and vegetation resources and water quality, because removing vegetation or otherwise disturbing soil increases the likelihood of adverse impacts to water resources.

Surface Water Quality

Adverse impacts to water quality are those that would result in a violation of water quality standard (e.g., not meeting drinking water standards), or degrade a designated beneficial use (e.g., suitability for game fish). Management that allows surface-disturbing activities that contribute to erosion, and therefore sediment delivery to water, would result in adverse impacts. Beneficial impacts to surface water quality result from management actions that directly improve water quality or that minimize, reduce, or prevent sediment flow into water. Other beneficial impacts to water quality result from management that limits the discharge of lower-quality water (e.g., water produced during minerals activities that has higher solids or salts) than the receiving water, or the discharge of water that degrades riparian-wetland and recharge areas. For example, management actions that stabilize watersheds or improve degraded portions of watersheds beneficially impact surface water quality. Therefore, the more an alternative limits surface disturbance that would result in adverse sedimentation or limits the release of lower quality water, the more beneficial the impacts to water quality.

Direct adverse impacts to surface water quality result from actions that degrade the quality of surface waters. For example, management actions that modify drainages, such as altering the number of linear water crossings or the distribution and condition of riparian-wetland areas, result in direct adverse impacts to surface water quality.

Indirect impacts result from actions that disturb soil and vegetation in a watershed, especially highly erodible soil, because this leads to increased sedimentation of the water.

Long-term impacts to surface water quality are those that result from bare soil that continues to erode because it is not revegetated within 5 years or because established point discharges (such as the surface release of produced water) are not expected to stop in 5 years. Short-term impacts include exceedance of state water quality standards that are mitigated or stopped within required timeframes, or surface disturbances that temporarily affect water quality and are reclaimed immediately after a temporary use.

Fire suppression and rehabilitation activities can impact water resources over the short and long terms. Activities such as firebreak construction, clearing vegetation, and the use of heavy equipment would disturb the soil surface and increase erosion and sediment production over the short term. For example, fire lines constructed during suppression efforts can channelize surface runoff, which can result in gully erosion. Over the long term, however, successful stabilization efforts can increase cover and result in a subsequent reduction in erosion and sediment production to natural rates.

Surface Water Quantity

Impacts to surface water quantity result from management actions that reduce or supplement streamflows, and can be either beneficial or adverse, depending on the quantity and the location of the withdrawal(s) and discharge(s).

Direct impacts to surface water quantity result from management actions (e.g., vegetative and physical treatments, impoundments, and retention and detention structures) that increase or decrease runoff, and from changes in the quantity of produced water discharged into the system.

Indirect impacts to surface water quantity result from management that modifies the capacity of stream channels or changes the amount of water reaching the stream system. For example, changes in the locations of roads that direct surface water runoff into drainages can increase or decrease the timing and amount of surface water flowing in the stream system. The distribution and condition of riparian-wetland areas would indirectly result in changes to surface water quantity because they increase infiltration and delay peak flows.

Long-term impacts to surface water quantity are those that result from actions that alter the amount of impervious surface in a drainage or change established discharges that alter supplemental streamflows (more than 5 years). Short-term impacts result from uses that temporarily affect water quantity, such as temporary impoundments or detention structures.

Although there are small differences among the alternatives regarding acres available for land tenure adjustments, direct impacts to surface water quality under any alternative would be negligible, and are not further addressed in this section. See the *Soil* section for potential impacts to soil resources, and therefore water quality.

Groundwater Quality and Quantity

Direct impacts to groundwater quality and quantity result from changes in the number of wells drilled in a given area, including domestic or municipal water supply wells, oil and gas wells, and water disposal or injection wells. Other factors include the numbers and locations of springs developed, whether there are water conservation efforts in an area, and the amount of water infiltration and recharge. Oil or gas well techniques, such as stimulation methods, also can directly impact groundwater.

Indirect impacts to groundwater quality and quantity result from activities that modify recharge areas related to a groundwater system(s). For example, activities that decrease vegetative cover or increase runoff can reduce infiltration of precipitation, thereby reducing recharge to groundwater aquifers.

Short-term impacts to groundwater can result from any temporary or short-term use of groundwater (e.g., temporary use of a well to supply water for drilling an exploratory gas well allotment). Long-term impacts to groundwater quality and quantity can result from permanent oil and gas fields and production facilities being constructed in recharge areas, or from landscape alterations that modify groundwater recharge. Such impacts can include wells that deplete an aquifer through extraction of water, paved surfaces and compacted soils that decrease water infiltration, or wells used to inject water of similar quality (disposal wells) into the aquifer. Actions that increase permeability, such as reclaiming disturbed areas and removing redundant roads, result in long-term beneficial impacts to groundwater quantity and, possibly, quality.

The primary BLM management action that impacts water quantity is minerals development. Some conventional oil and gas development and locatable minerals activity, and much CBNG activity, produces groundwater as an ancillary by-product of mineral activities. The amounts, locations, and types of water produced varies from site to site, and often is known only after activities begin. For example, in situ leach recovery of uranium intentionally uses a “bleed off” of a percentage of groundwater to maintain the pressure necessary to recover the uranium. The impacts of these management actions cannot be identified on a planning area-wide basis and need to be analyzed in a site-specific NEPA document. Impacts to groundwater quantity from minerals activities under the alternatives are not further analyzed other than to state that the more minerals activities, the more adverse impacts to groundwater quantity and the more likely the increase of surface water quantity. The BLM does not anticipate that there would be any impacts associated with produced water except on a site-specific basis.

4.1.4.1. Summary of Impacts

Impacts to surface water and groundwater quality would directly relate to the amount of surface disturbance allowed under an alternative. Using the amount of surface disturbance as the metric, Alternative B would result in the fewest adverse impacts to and greatest protections for water resources. Management actions under this alternative would result in the least amount of projected surface disturbance and most restrictions on resource uses, and therefore the least amount of potential impact to surface water and groundwater quality and quantity. Conversely, based on anticipated surface disturbance alone, Alternative C would result in the greatest adverse impacts to water resources. Alternative C manages surface disturbance more like Alternative A than like Alternative B. Alternative D would result in beneficial impacts much more like Alternative B than like Alternative A.

4.1.4.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Actions that disturb soils, particularly soils most susceptible to erosion, are the most likely to create dust or deliver sediment to waterbodies and adversely impact surface water. Erosion contributes to sedimentation if the sediment is delivered to the surface water drainage system either as fugitive dust or carried by surface water. The amount carried by surface water is limited by the effectiveness of storm water discharge practices and the buffering capacity of the land over which the water flows before reaching drainage.
- The extent of unsurfaced roads (i.e., those without gravel or any other added surface material) and the degree of usage is an indicator of the quantity of sediment delivery that could impact surface water quality within each watershed (Furniss et al. 2000). The alternatives vary substantially in the number and types of ROWs likely to be authorized and the amount of traffic likely to be generated by authorized activities. Therefore, to the extent that an alternative limits resource uses, such as closing an area to oil and gas development or reducing areas open to motorized travel, it would involve fewer unsurfaced roads and avoid traffic from oil and gas operations over unsurfaced roads. Therefore, reduced resource use is an indicator of beneficial impacts to water quality.
- All alternatives employ various methods to minimize adverse impacts to water quality. BMPs, watershed enhancement projects, conservation practices, Storm Water Discharge Plans, Weed Management Area Plans, project-specific soil investigations, and reclamation plans are designed to reduce impacts to soil and vegetation, which in turn protects water resources by reducing runoff and sediment yield. Limiting motorized vehicle use to existing roads and trails would prevent route proliferation and vegetation removal, which could decrease erosion. In addition, management actions that restore plant communities would enhance water resources by restoring infiltration, organic matter content, and productivity, and by reducing erosion and the generation of sediment. Impacts from surface-disturbing and disruptive activities are mitigated through the application of the Wyoming BLM Standard Mitigation Guidelines for Surface-Disturbing and Disruptive Activities (Appendix M (p. 1489)).
- Substantial disturbance to soil, including compaction or changes in vegetative cover, increases water runoff and downstream sediment loads and lowers soil productivity, thereby degrading water quality, channel structure, and overall watershed health. The degree of impact attributed to any one disturbance or series of disturbances is influenced by several factors, including location within the watershed, time and degree of disturbance, existing vegetation, and precipitation. Only a site-specific analysis can address these potential impacts to water.

- Changes in channel geometry due to surface-disturbing activities would be likely to adversely impact water quality. Sediment in channels is necessary for maintaining channel geomorphology and building riparian-wetland systems. Most channel systems achieve a channel form in equilibrium to the water and sediment being naturally supplied to it, and generally respond to changes in sediment loads or streamflows by changing the channel form.
- Actions that protect soil and vegetation resources will generally mitigate or prevent adverse impacts to water resources as well.
- As the local population expands in the planning area, new disturbances related to OHV use will likely continue, with adverse impacts to soil and vegetation resources and water quality.
- Surface-disturbing and other activities are most likely to adversely impact the parts of the planning area with depths to groundwater of less than 100 feet. The shallower the water, the more sensitive an aquifer to contamination (Wyoming Geographic Information Science Center 2003).
- Changes in surface water quality, such as increases in pollutants or physical parameters (e.g., temperature), can degrade habitat used by aquatic life and can affect other designated uses (e.g., livestock watering, irrigation, and drinking water supplies).
- BLM Wyoming state office policy requires the BLM to ensure that surface-disturbing activities comply with the CWA National Pollutant Discharge Elimination System Storm Water Discharge provisions as administered by the Wyoming DEQ. This program is designed to hold soil on construction and industrial sites and keep it from running offsite as sediment and causing adverse impacts to water quality. This CWA program will be complied with for all Wyoming DEQ-regulated surface disturbances; at present, this applies to all surface disturbances of 1 or more acre.
- Potential surface water and groundwater quality impairments are identified through inventories and routine monitoring activities and reported to the Wyoming DEQ, the regulatory agency that enforces the CWA and state water quality statutes. The U.S. Army Corps of Engineers regulates CWA section 404 provisions regarding riparian-wetland disturbance and channel modifications to waters of the United States. The EPA regulates drinking water quality in the state.
- All alternatives require inventory and condition assessment of reservoirs on BLM-administered lands in the planning area. Functionally compromised reservoirs will be repaired or reclaimed.
- The Lander Field Office will develop and implement watershed management plans as necessary and cooperate with ongoing watershed management initiatives of other stakeholders.
- The BLM manages water quality to meet Wyoming Standards for Healthy Rangelands, which protect and improve rangeland health, including water resources. Wyoming Standards for Healthy Rangelands are applied to all activities, not just livestock grazing.
- The acreage in the planning area managed as WSAs (55,338 acres) is the same under all alternatives, and all alternatives prohibit surface-disturbing activities in WSAs; this prevents adverse impacts to water resources in WSAs.
- Management actions that protect or enhance water resources, regardless of alternative, include but are not limited to, implementing BMPs for erosion and sediment control; employing watershed improvement and conservation practices; timely restoration of healthy plant communities and vegetative cover after surface disturbance; managing water resources to meet Wyoming Standards for Healthy Rangelands; achieving PFC and meeting state water quality standards; and participating with the Wyoming DEQ in the development and implementation of watershed management plans or total maximum daily load (TMDL) allocation plans.

4.1.4.3. Detailed Analysis of Alternatives

4.1.4.3.1. Impacts Common to All Alternatives

Impacts to Surface Water Quality

Surface water quality on BLM-administered surface lands and federal mineral estate could degrade under each alternative from activities proposed across a variety of resource programs. Impacts to water quality associated with these disturbances are projected to occur under each alternative, although the intensity of the impacts would vary across alternatives. Appendix T (p. 1535) lists projected surface disturbance by alternative during the planning period.

No long-term surface disturbance or associated erosion is anticipated from prescribed fire, chemical treatments, or mechanical fuels treatments following reclamation. Fuels management could result in short-term adverse impacts and long-term beneficial impacts to water quality.

Wildland fire in the planning area can impact water quality over the short term by removing vegetation and exposing soils to water and wind erosion, thereby generating sediment. Under certain conditions, hot fires can create hydrophobic soil conditions (i.e., resistance to water infiltration), whereby runoff and erosion increase; see the *Soil* section. Over the long term, if provided vegetative recovery is successful, fire can beneficially impact water quality by improving land health, reducing erosion and sediment contribution, and lowering the risk of landscape-level fire. The impacts of fighting wildland fires and the use of wildland fire to restore fire-adapted ecosystems or reduce hazardous fuels varies by alternative. On a planning-level scale, it is not possible to analyze impacts to water resources under individual alternatives because of the unpredictable nature of wildland fire and the contributions of weather, disease, and climate change.

Under all alternatives, surface-disturbing vegetative treatment projects to achieve management goals would result in short-term increases in erosion and potential sediment generation; however, these adverse impacts would be ameliorated over the long term as vegetation reestablishes on treated sites.

All alternatives manage riparian-wetland areas to meet or exceed PFC and Wyoming Standards for Healthy Rangelands. This could involve rest or deferment from grazing pressure, fencing projects, structural in-stream projects, or any combination of thereof. Fencing and in-stream structural placement would necessarily involve short-term water quality degradation, but over the long term, water quality would return to meet or exceed that required to meet the designated beneficial uses.

INNS that form monoculture stands, such as leafy spurge and Russian knapweed, can exacerbate erosion by reducing vegetative cover, with resulting adverse impacts to water resources. The same is true of infestations of annual INNS species like cheatgrass and halogeton. The presence of INNS can alter natural fire regimes and increase fire frequency, which would lead to accelerated soil erosion and result in sediment deposition to waterbodies. Some annual INNS can result in a short-term beneficial impact because they can serve as a nurse crop to give a limited degree of erosion protection and sediment control while species planted for reclamation establish.

When watersheds lack vegetation, surface infiltration into the soil decreases, causing more runoff to reach stream systems. As surface disturbance increases, so does the amount of bare soil, compacted soils, and possibly less-pervious areas in a watershed. Therefore, more surface water runoff reaches streams in a shorter period, which increases the potential for sedimentation and the frequency of flooding or erosive velocities from high flows in channels. Conversely, activities such as reclamation would improve vegetative cover and would beneficially impact water resources. Healthy vegetative cover increases infiltration of surface water flows, filters out sediment before it reaches drainages, reduces runoff, and lowers peak flows in the surface water system. Prescribed fire reduces vegetative cover and increases sedimentation over the short term, but restoring fire-adapted ecosystems increases vegetative cover and decreases the potential for large landscape-level fires over the long term. Concentrated grazing by livestock, wild horses, and wildlife can contribute to soil compaction and damage the vegetative cover and soil crust, therefore increasing surface water runoff, erosion, and sedimentation. Produced water from oil and gas wells is sometimes discharged to surface waters, thereby contributing to surface water flows. Beneficial impacts from produced water discharges include increased availability of surface water; however, there can be adverse impacts from altering natural flow regimes, such as increased channel erosion, which would offset beneficial impacts.

Impacts to water resources from wild horses would be similar to those described in the *Soil* section.

Under all alternatives, approximately 97 percent of the planning area is open to livestock grazing. Properly managed livestock grazing at appropriate stocking levels can have a neutral to beneficial impact on vegetation and soil resources, and therefore water resources. These impacts are measurable only on a site-specific basis. The alternatives vary in how rangeland health standards and PFC will be achieved through managing livestock grazing. These differences are analyzed below by alternative.

The acreage of WSAs (55,338 acres) is the same under all alternatives, and all alternatives prohibit surface-disturbing activities in those areas. While travel management in WSAs varies by alternative, the differences in impacts to water resources is too small to analyze.

All alternatives include actions that restrict surface disturbance, which is generally considered to beneficially impact water resources. For example, withdrawals that close areas to surface-disturbing activities or requirements for construction, operation, monitoring, and rehabilitation planning before surface-disturbing activities are initiated would, at a minimum, reduce the potential for adverse impacts to water resources from surface-disturbing activities.

Surface-disturbing activities associated with minerals development expose soils to increased erosion and increased rates and volumes of runoff over the short and long terms. For the projected acres of disturbance under Alternative A, see Appendix T (p. 1535). Increases in surface disturbance related to lands actions and minerals development can be expected to result in a proportionate increase in adverse impacts to water resources. See the *Soil* section for acres of surface disturbance from mineral and realty actions under Alternative A.

Impacts to Surface Water Quantity

Management of forest product sales primarily results in impacts to soil resources, and secondarily to water resources. As discussed in the *Soil* section, while each alternative includes different management actions for forest product sales (also see Chapter 2), impacts are not expected to vary by alternative because of the depressed demand for forest products in the planning area. Cutting of forest products can result in short-term and potentially long-term adverse impacts to water resources by removing vegetation and increasing erosion and surface disturbance. However, the BLM has not identified any reasonably foreseeable demand for substantial quantities of forest products, so impacts to water resources from management of forest product sales are not analyzed.

Impacts to Groundwater Quality and Quantity

Groundwater contamination can come from point sources, such as chemical spills, chemical storage tanks (aboveground and underground), industrial sites, landfills, household septic tanks, oil and gas well sites, oil and gas detention and retention ponds, well stimulation and hydraulic fracturing, and mining activities. Of solid minerals mining activities potentially impacting groundwater in the planning area, the legacy of past uranium mining and the potential of future in situ recovery operations have the greatest potential to impact groundwater quality (e.g., produced-water bleed, leakage past approved areas, acid pit lakes, and contaminated plumes from tailings ponds). Other possible sources of groundwater contamination are nonpoint sources such as roadways and agricultural activities. Groundwater quality is most susceptible to pollution where the aquifer is shallow (within 100 feet of the surface), very permeable, or connected directly to a surface water system, such as river gravels. Produced water from oil and gas wells, including CBNG and conventional production, would have the greatest potential to impact groundwater quality and quantity where the wells are in areas with shallow depth to groundwater. Water produced from future CBNG wells in the planning area is expected to be of essentially the same quality and quantity as produced water from conventional or deep oil and gas wells.

4.1.4.3.2. Alternative A

4.1.4.3.2.1. Program Management

Alternative A prohibits or avoids surface-disturbing activities in groundwater recharge areas to prevent contamination on a case-by-case basis. Alternative A manages minerals and realty actions in these areas with standard stipulations. Pesticide use in aquifer recharge areas under Alternative A is the same as that specified on the legal pesticide label use restrictions.

Alternative A manages permanent facilities in floodplains and riparian-wetlands with moderate restrictions, except to benefit watershed health or vegetation, and considers linear water crossings on a case-by-case basis. This management would result in beneficial impacts to water resources.

4.1.4.3.2.2. Resources

Alternative A air quality and soils management would result in moderate beneficial impacts to water quality because it applies only statewide standard restrictions to surface-disturbing activities. Alternative A authorizes surface-disturbing activities in LRP areas with mitigation on a project-by-project basis using a detailed site analysis and reclamation objectives. This would benefit water quality and quantity. Alternative A also avoids surface disturbance of LRP soils whenever possible. To the extent that LRP soils are avoided, adverse impacts to water quality would be avoided. Similarly, the provisions of the Wyoming Stormwater Discharge program will help avoid adverse impacts to water resources from accelerated erosion and sediment loading. All of these management measures designed to forestall accelerated erosion and soil compaction would beneficially impact water resources by keeping sediment levels and runoff to natural levels.

There are no special management prescriptions for lands with wilderness characteristics under Alternative A.

Alternative A uses full suppression of fire and allows soil disturbance associated with suppression activities on a case-by-case basis. See above under *Impacts Common to All Alternatives* for impacts to water quality and quantity based on some fire suppression.

Alternative A manages activities likely to spread INNS on a case-by-case basis. Impacts to resources attributed to INNS are addressed above under *Impacts Common to All Alternatives*.

Alternative A prohibits surface-disturbing activities within 500 feet of surface water and riparian-wetlands unless the activities are necessary and their impacts can be mitigated. This buffer would protect water resources from both short- and long-term adverse impacts.

Alternative A management actions designed to protect wildlife and special status species habitat from the impacts of surface-disturbing and disruptive activities also would protect water resources from the adverse impacts associated with these activities. See Appendix T (p. 1535) for acres of projected surface disturbance. Management prescriptions under Alternative A designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and disruptive activities also would protect water resources.

4.1.4.3.2.3. Resource Uses

Under Alternative A, projected acres of disturbance from locatable minerals, leasable minerals, and mineral materials disposal management are listed in Appendix T (p. 1535). There would be a commensurate potential to adversely impact water quality and possibly water quantity to the extent that produced water is depleted. Impacts to water quality from ROWs, including industrial wind-energy development, would be secondary to impacts to vegetation and soils. See the *Soil* section. Alternative A considers oil and gas leasing in the area along the east side of Boysen Reservoir on a case-by-case basis, which could adversely impact water quality.

Livestock grazing management under Alternative A provides for protection or enhancement of other resource values, which would beneficially impact water resources. Alternative A prohibits the placement of salt or mineral supplements within ¼ mile of water, riparian-wetland areas, and reclaimed or reforested areas, which would reduce vegetation removal, soil compaction, and sediment production from concentrated livestock grazing and traffic. Alternative A allows rangeland improvement projects on a case-by-case basis; see analysis in the *Soil* section. Revegetation would usually occur within several growing seasons, and long-term erosion rates and sediment production should return to normal as upland sites farther from water are reclaimed to an appropriate percent of ground cover that would be expected for the historic plant community for a given site. However, unprotected water source developments subjected to improper livestock grazing management would typically become livestock concentration areas denuded of vegetation and subject to accelerated erosion rates and generation of sediment. Soil compaction, reduced infiltration, increased surface runoff, trail formation, and sediment generation can occur in these upland to wet lowland (or water development) transition zones. In addition, livestock concentration can compound the localized degradation of water resources usually found near uncontrolled water sources by channeling upland runoff in the transition zones down to the lowlands.

On a case-by-case basis, Alternative A uses the Wyoming Standards for Healthy Rangelands systematic assessment approach and PFC data to identify riparian-wetland areas that need improvement. Alternative A employs a variety of measures and passive and active (constructed projects) management to stop accelerated erosion and sediment production and restore long-term health and productivity to surface waters. These measures include fenced riparian-wetland exclosures and pastures, short-term rest from grazing, and grazing strategies favorable to riparian-wetland enhancement. Adverse impacts from range development projects can involve short-term accelerated erosion and sediment contribution from fence installation or livestock hoof action, but these impacts are expected to disappear over the long term and lead to improved conditions in riparian-wetlands. There could be long-term adverse impacts to water quality from areas denuded of vegetation and the resulting accelerated erosion.

Alternative A travel management would beneficially impact soils and vegetation, and therefore water resources by limiting travel to existing or designated roads and trails and prohibiting cross-country travel. In addition, Alternative A closes 5,923 acres to motorized travel; seasonally closes 111,002 acres to motorized travel; limits motorized travel to designated roads and trails on 163,075 acres, and closes over-snow vehicle use on 14,729 acres. As discussed under *Impacts Common to All Alternatives*, limiting travel management either seasonally or entirely beneficially impacts water resources by beneficially impacting soil and vegetation resources. Alternative A does not require a minimum snow cover for cross-country travel, which could result in adverse impacts to soil and vegetation, and therefore water resources from over-snow vehicle use if there is not sufficient snow cover.

Recreation-related adverse impacts to water resources can take the form of soil compaction, soil particle detachment, dust evolution, and increased vulnerability to water and wind erosion from authorized large-group activities, the repeated use of undeveloped campsites, and cross-country mechanized travel.

4.1.4.3.2.4. Special Designations

Congressionally Designated Trails management under Alternative A protects ¼ mile on each side of the National Historic Trails (NHTs) from surface disturbance, and in some cases, a slightly greater distance. To the extent there are water resources in or near this buffer, the buffer would benefit the water resources by limiting erosion and sedimentation.

Alternative A limits motorized travel in all eight WSAs to designated roads and trails, except in the Dubois Badlands WSA, which the alternative closes to motorized travel. This management would have a minor beneficial impact to water quality in those areas.

Alternative A also manages nine waterways as eligible for inclusion in the NWSRS for their ORVs by restricting surface disturbance within ¼ mile of the waters, This would benefit water resources by limiting erosion and sedimentation in those areas.

Alternative A places moderate constraints on surface-disturbing and disruptive activities on 119,622 acres in ACECs where surface disturbance is minimized and where Plans of Operation are required for minerals development. The existing ACECs designated under Alternative A moderately restrict surface-disturbing activities, except in ACECs avoided for major ROWs, which would beneficially impact water resources.

4.1.4.3.3. Alternative B

4.1.4.3.3.1. Program Management

Alternative B limits more surface disturbance than Alternative A, and avoids surface-disturbing and disruptive activities in sole-source aquifers and groundwater recharge areas. Mineral and realty actions in areas underlain by an identified sole-source aquifer are managed with moderate restrictions. Alternative B also prohibits pesticide use in identified aquifer recharge areas and any areas underlain by a sole-source aquifer or wellhead protection area. Alternative B would better protect groundwater recharge areas against accidental contamination. Alternative B implements management actions on a watershed basis to prevent degradation of surface water and groundwater and to improve water quality, using existing watershed plans where possible. In general, Alternative B water management is more protective of water quality and quantity than Alternative A.

4.1.4.3.3.2. Resources

Management actions under Alternative B designed to prohibit, avoid, or mitigate soil erosion also would beneficially impact water resources by eliminating sediment production and delivery that would result from authorized surface-disturbing activities capable of causing accelerated soil erosion. See the analysis in the *Soil* section. Alternative B would result in more beneficial impacts to water resources than Alternative A, particularly related to disturbance in LRP soils and limiting disturbance on slopes less than 15 percent.

Alternative B manages 5,490 acres in the Little Red Creek Complex near Dubois as non-WSA lands with wilderness characteristics and closes these areas to motorized and mechanized travel. This would beneficially impact water resources by protecting them from erosion and runoff due to surface-disturbing activities. Alternative A does not include special management for these lands.

Alternative B proactively manages INNS and would likely be more successful in controlling the spread of INNS; see the *Soil* section. Impacts to water resources attributed to INNS are described above under *Impacts Common to All Alternatives* and in the *Invasive Species and Pest Management* section of this chapter. Alternative B will better limit the introduction and spread of INNS and therefore be more likely to prevent the spread and adverse impacts associated with INNS (e.g., accelerated erosion and increased runoff and sediment generation). However, limitations on pesticide use under Alternative B might be less effective in controlling INNS near water recharge areas and sole-source aquifers than Alternative A, which does not include that restriction.

Alternative B prohibits permanent facilities in floodplains and riparian-wetlands, which would result in more beneficial impacts to water resources than Alternative A, which only avoids those areas. This wide buffer and moderate restrictions on surface use would protect water resources from surface disturbance and the resulting sediment generation. As previously stated, alternatives involving the least amount of surface disturbance would be expected to indirectly benefit the control of accelerated erosion; Alternative B includes many more acres of protection for riparian-wetlands and transition zones than Alternative A.

Management actions under Alternative B designed to protect wildlife and special status species habitat from the impacts of surface-disturbing and disruptive activities also would protect water resources from impacts associated with these activities. Alternative B limits substantially more surface disturbance than Alternative A, including closing greater sage-grouse Core Area to oil and gas leasing, limiting surface disturbance within 0.6 mile of leks, and applying timing restrictions that would have the effect of protecting soil and therefore water during vulnerable times; see the *Soil* section. Less surface disturbance means fewer adverse impacts to soil, vegetation, and water resources. Alternative B management would systematically inventory and close unnecessary roads and trails and prescribe rehabilitation for them, which would help control runoff and sediment. Comparatively, Alternative A, on a case-by-case basis, closes and reclaims unnecessary roads and old mineral exploration trails, which would result in fewer beneficial impacts to water resources. The difference in beneficial impacts would depend on reclaiming roads that contribute to erosion and sedimentation of waters.

Alternative B includes the construction and upgrade of a wild-horse viewing loop road. Short-term adverse impacts to vegetation, soil, and water resources would include increased erosion in the area of construction, but as cut-and-fill slopes are rehabilitated, long-term impacts from erosion and sediment should be negligible. Alternative A does not include wild-horse viewing road designation or construction, but would result in the use of unimproved roads for horse viewing, which also would adversely impact soil and water resources.

Management prescriptions under Alternative B designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and disruptive activities also would protect water resources. Generally, this alternative would provide more secondary protections to water resources than Alternative A.

4.1.4.3.3.3. Resource Uses

Surface-disturbing activities associated with minerals development expose soils to increased erosion and sediment generation over the short and long terms. For projected acres of disturbance under Alternative B, see Appendix T (p. 1535). Alternative B decreases the amount and severity of surface disturbance related to mineral development (leasable minerals, locatable minerals, mineral materials disposals, and geothermal leasing) substantially compared to Alternative A. Therefore, Alternative B would be expected to result in a proportionate decrease in risk of adverse impacts to water quality.

Alternative B management limits acres open to oil and gas and locatable mineral entry, which would reduce the potential for adverse impacts to water quantity compared to Alternative A, particularly in the area on the west side of Boysen Reservoir.

Industrial wind-energy development and ROWs result in surface disturbance, with the potential for adverse impacts to water quality. Alternative B opens substantially less acreage for industrial wind-energy development and ROWs than Alternative A, and manages more area as ROW avoidance and exclusion areas. Alternative B limits new ROWs to designated corridors and co-locates them with existing disturbance. The reduction in surface disturbance under Alternative B would likely result in fewer adverse impacts to water resources than Alternative A; see the *Soil* section for additional analysis.

Alternative B livestock grazing management provides for more protection or enhancement of other resource values than Alternative A; this would beneficially impact water resources. Alternative B prohibits the placement of salt or mineral supplements over a larger area than Alternative A; these provisions would reduce vegetation removal, soil compaction, runoff, and the risk of accelerated erosion from concentrated livestock grazing and traffic and the resulting adverse impacts to water resources.

This alternative emphasizes the use of non-structural grazing management to achieve or maintain Wyoming Standards for Healthy Rangelands. Alternative B does not allow new range improvements if they would result in adverse impacts to other resources. The establishment of forage reserves, as opportunities arise, is also provided for under this alternative. This approach should result in the fewest adverse impacts to water resources from range improvement project construction over the short and long terms. Alternative B low to moderate forage utilization would be more beneficial to water resources than management under Alternative A, which establishes forage utilization levels for livestock grazing on a case-by-case basis. However, improvements in riparian-wetland areas could be slower under Alternative B, and therefore take longer to beneficially impact water quality because riparian-wetland exclosure fences would not be used. Because range improvement projects would not be used for infrastructure, projects that would directly benefit water resources, such as improvements to riparian-wetland areas or vegetative treatments to eliminate heavy water users such as Russian olive, would be implemented.

With more restrictive travel, there would be less surface disturbance and fewer adverse impacts from accelerated erosion and runoff under Alternative B than under Alternative A.

4.1.4.3.3.4. Special Designations

Alternative B limits surface disturbance in a much larger buffer around Congressionally Designated Trails than Alternative A and, to the extent that water resources are in or near this buffer or would be receiving waters for erosion associated with surface disturbance, this larger buffer would beneficially impact water quality.

Unlike Alternative A, Alternative B closes all WSAs to motorized and mechanized travel. This would minimize soil erosion and runoff in these areas and beneficially impact water resources. Alternative B manages all NWSRS-eligible waterway segments as suitable for inclusion in the NWSRS. This management would result in similar beneficial impacts to water quality as Alternative A, because of similar limitations on surface disturbance.

Alternative B designates 1,492,990 acres as ACECs (approximately 12.4 times the acres under Alternative A) and places very restrictive constraints on surface-disturbing activities in the ACECs. This would result in more beneficial impacts to water resources than the more moderate restraints under Alternative A. All of the ACECs under Alternative B are excluded to ROWs, which would better limit adverse impacts to water resources.

4.1.4.3.4. Alternative C

4.1.4.3.4.1. Program Management

Most program management actions under Alternative C are the same as under Alternative A, with the following exceptions:

Alternative C allows new permanent facilities in floodplains and riparian-wetland areas provided there are no practicable alternative locations and there is mitigation sufficient to ensure the action would meet the requirements of Executive Orders 11988 and 11990, CWA wetland protections, and federal and state water quality requirements. This management would have impacts very similar to Alternative C.

Like Alternative A, Alternative C does not include protective management for groundwater recharge areas to control potential chemical contamination, runoff, and sediment. Alternative C allows more surface disturbance in comparison to alternatives A and B, with the potential for adverse impacts to water quality and quantity. Impacts to water resources under Alternative C would be very similar to impacts under Alternative A, although possibly somewhat more adverse.

4.1.4.3.4.2. Resources

Air quality, soils, lands with wilderness characteristics, and INNS program management under Alternative C are similar to Alternative A, and would result in the same limited beneficial impacts to water quality and quantity as described above under *Alternative B, Resources*.

Alternative C has the same 500-foot buffer around riparian-wetlands as Alternative A, except when it can be shown that equivalent protection for riparian-wetland areas can be achieved using a smaller buffer distance. Alternatives A and C would be similar in their beneficial impacts to water quality, and would result in somewhat fewer beneficial impacts than Alternative B. Additional analysis of riparian-wetland management under Alternative C is provided in the discussion of livestock grazing.

Alternative C wildlife and special status species program management is very similar to Alternative A, and would result in the same beneficial impacts. Alternative C wildlife resources management does not close and reclaim unnecessary roads and old mineral exploration trails, and would not have the beneficial impacts to water quality that might be achieved under Alternative A or B. Alternative C provides the fewest protections for special status species, and would have more potential for adverse impacts to water resources.

Management prescriptions under Alternative C designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and disruptive activities also would protect water resources. See the resource-specific sections in this chapter for those management prescriptions. Generally, Alternative C would provide the fewest protections for water resources compared to the other alternatives.

4.1.4.3.4.3. Resource Uses

Surface-disturbing activities associated with minerals development expose soils to increased erosion over the short and long terms (see Appendix T (p. 1535) for projected acres of disturbance under Alternative C). Alternative C increases the amount and severity of surface disturbance related to minerals development (leasable minerals, locatable minerals, mineral materials disposals, and geothermal leasing) substantially compared to alternatives A and B, which would be expected to result in a proportionate increase in risk of adverse impacts to water resources as runoff and sediment increase above natural levels. Like Alternative A, Alternative C considers oil and gas leasing in the area along the east side of Boysen Reservoir on a case-by-case basis, which could adversely impact water quality.

Alternative C manages the least amount of area that is excluded from wind-energy and ROW development compared to the other alternatives. Because so much more area is available for disturbance, impacts to water quality would likely be proportionately greater.

Alternative C authorizes livestock grazing with moderate livestock utilization (41 to 60 percent) rather than setting utilization levels on a case-by-case basis as does Alternative A, or by prescribing light (20 to 40 percent) utilization levels as does Alternative B. This higher utilization would necessitate more monitoring and leave less room for error than light utilization, risk greater adverse impacts to the plant community because it would increase soil compaction in livestock concentration areas, and have the potential to accelerate erosion through the removal of vegetation below the threshold at which a particular site would experience adverse impacts.

Efforts to meet the Wyoming Standards for Healthy Rangelands for water quality and riparian-wetland management under Alternative C rely on a variety of measures and passive and active (constructed projects) management to correct water resource problems from accelerated erosion and restore long-term health and productivity to these areas. These measures include fencing riparian-wetland exclosures and pastures, short-term rest, and grazing strategies favorable to riparian-wetlands enhancement. Project impacts associated with riparian-wetland areas can involve short-term accelerated erosion from fence installation or livestock walking on the surface, but impacts of range improvement projects would be expected to disappear over the long term and lead to improved conditions.

Alternative C livestock grazing management would, if properly applied, yield the most expedient results and protect water resources best (without consideration of adverse impacts to other resources). Alternative C could lead to quicker riparian-wetlands improvement, and greater resistance to soil erosion and less sediment generation than Alternative B. However, the risk of adverse impacts associated with infrastructure projects also would be greater. In addition, Alternative C would utilize infrastructure range projects with correspondingly less emphasis on non-infrastructure range improvement projects such as vegetative treatments or aspen or willow treatments, which would beneficially impact water resources.

Alternative C prescriptions for buffers for salt or mineral supplements are very similar to those under Alternative A, with similar beneficial impacts to water quality. Alternative B would result in the most beneficial impacts to water resources by reducing soil compaction and accelerated erosion compared to Alternative A, which would result in minor additional beneficial impacts compared to Alternative C.

Alternative C closes the fewest acres to motorized travel and closes no acres seasonally to motorized travel. There are no acres closed to over-snow vehicle use, so there are no protections for soil and vegetation even if snow covering is light. This would have the potential to increase erosion and therefore adversely impact water resources. Compared to alternatives A and B, Alternative C is the least restrictive for motorized travel in the planning area and would allow the most opportunities for adverse impacts to water resources from soil compaction and accelerated erosion. However, like all alternatives, Alternative C would beneficially impact soil resources by prohibiting cross-country motorized vehicle use (except regarding over-snow vehicle use).

4.1.4.3.4.4. Special Designations

Congressionally Designated Trails receive minimal protections under Alternative C, which is slightly less protective of water resources than Alternative A. To the extent that water is available in the protective buffer under Alternative B or would receive erosion from surface disturbances, adverse impacts to water quality from surface disturbance would be much greater under Alternative B than under Alternative C.

WSA management under Alternative C is the same as Alternative A, which does not close most WSAs to motorized travel. Alternative B closes all WSAs to motorized travel and would provide more protections for water resources from the adverse impacts of vehicular traffic.

Alternative C does not manage any NWSRS-eligible waterway segments to maintain their suitability for inclusion in the NWSRS, so it would not preclude surface disturbance in a ¼-mile buffer, with resulting adverse impacts to adjoining water quality. In this regard, Alternative C would result in the fewest beneficial impacts to water resources.

Alternative C designates no ACECs; therefore, it limits surface management to standard statewide stipulations. This would result in greater adverse impacts to water resources than Alternative A or B, and compared to Alternative B, the difference would be major. Absent ACEC designation, there would be no Plans of Operation for locatable minerals exploration up to 5 acres in size, and there would be more potential for adverse impacts to water quality. Under Alternative C, much more surface disturbance in general through minerals activities and ROWs would be likely in areas that other alternatives designate as ACECs (Appendix T (p. 1535)). ACEC prescriptions under other alternatives would decrease the likelihood of adverse impacts to water resources from surface-disturbing activities and INNS over the short and long terms best under Alternative B and less well under Alternative A. Alternative C does not provide similar protections.

4.1.4.3.5. Alternative D

4.1.4.3.5.1. Program Management

Alternative D water resources program management is similar to Alternative B, but has somewhat fewer restrictions on surface disturbance. Sole-source aquifers and groundwater recharge areas are avoided and pesticide use is allowed in recharge areas if no other type of treatment would be successful. Alternative D would result in substantially fewer adverse impacts to water resources than alternatives A and C, both of which authorize more surface disturbance.

4.1.4.3.5.2. Resources

Management actions for air quality and soil resources under Alternative D are very similar to those under Alternative A, and would result in the same impacts to water quality and quantity.

Alternative D manages the Little Red Creek Complex as non-WSA lands with wilderness characteristics. Although it manages slightly fewer acres for wilderness characteristics than Alternative B, Alternative D management would result in essentially the same beneficial impacts to water as Alternative B, considerably more beneficial impacts than Alternative C, and slightly more beneficial impacts than Alternative A; Alternative A likely will limit surface disturbance in the Little Red Creek Complex because of nearby wilderness (Shoshone National Forest) and the Whiskey Mountain ACEC. See the discussion for Special Designations below.

Management of forest product sales and forests and woodlands under Alternative D limits silviculture techniques to only as needed to protect resources; this would likely result in more beneficial impacts to water resources than alternatives A and C, which include artificial slope and riparian-wetland limitations, regardless of impacts. While the more restrictive management under Alternative B would result in more short-term beneficial impacts, over the long term, the limits on silviculture techniques under Alternative B would likely result in more adverse impacts because commercial thinning or fuel reductions would not likely occur. However, as previously stated, the actual impacts to water resources would not vary substantially by alternative because of depressed demand for forest products.

INNS management prescriptions under Alternative D are the same as under Alternative B. Compared to alternatives A and C, Alternative D takes a more proactive approach to INNS management which would better control the impacts of erosion related to INNS infestations. Moreover, Alternative D involves the second lowest amount of surface disturbance and second most management focus on reducing duplicative roads next to Alternative B. The best indicator of

INNS infestation potential is the amount of surface disturbance and roads. While INNS impact water quality only secondarily, the adverse impacts of INNS to soil and vegetation would lead to adverse impacts to water resources over time.

Riparian-wetland management under Alternative D applies the same riparian-wetlands buffer as Alternative A, and therefore would result in similar beneficial impacts to water resources. This buffer will afford some protection to native plant communities from potential soil compaction and accelerated erosion over the short and long terms, but not as much protection as Alternative B, which applies a buffer 2 and a half times wider (1,320 feet) and would afford greater protection from surface disturbances than Alternative A, C, or D. The Alternative D management approach for riparian-wetlands relates to livestock grazing management; impacts to soil resources are addressed in the discussion below for grazing.

Alternative D is similar to Alternative B in its wildlife protections, including greater sage-grouse lek protections, except that Alternative D is less protective, particularly in non-Core Area and regarding solid mineral leasing. Alternative D wildlife management is more protective of water resources than Alternative A, and considerably more protective than Alternative C, because Alternative D closes much more area to surface disturbance (Appendix T (p. 1535)).

Management prescriptions under Alternative D designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and disruptive activities also would protect soil resources from these activities. See resource-specific sections for the prescriptions.

4.1.4.3.5.3. Resource Uses

Surface-disturbing activities associated with mineral development expose soils to increased erosion potential and INNS invasion over the short and long terms (for projected acres of disturbance under Alternative D, see Appendix T (p. 1535)). Alternative D decreases the amount and severity of surface disturbance related to minerals development (leasable minerals, locatable minerals, mineral materials disposal, and geothermal leasing) substantially compared to alternatives A and C; this would be expected to result in a proportionate decrease in risk of adverse impacts to water resources from compaction and accelerated erosion. Alternative D would result in fewer beneficial impacts than Alternative B, because Alternative D closes or applies major constraints on oil and gas leasing on less of the planning area. This would be particularly true for soil resources outside greater sage-grouse Core Area. However, Alternative D, like Alternative B, closes the area to the east of Boysen Reservoir to oil and gas leasing, so Alternative D would have the same beneficial impacts to water quality.

Refer to Table 2.3, “Comparative Summary of Proposed Land Use Decisions in the Lander Planning Area” (p. 32) for acres open, avoided, or excluded for industrial wind-energy development under Alternative D. However, only 58,536 of these acres are in areas with high wind-energy potential; see the *Soil* section for a discussion of impacts to soil and vegetation, which would result in long-term adverse impacts to water quality. Alternative D ROW management is similar to Alternative B, although Alternative D designates more corridors and the corridors are wider than those designated under Alternative B. See the *Soil* section for an analysis of impacts on soil and vegetation from ROWs, which lead to long-term adverse impacts to water quality.

Livestock grazing management under Alternative D would result in more beneficial impacts to water resources than Alternative A as a result of substantially more restrictions on the placement of salt or mineral supplements. Alternative D would result in more beneficial impacts to water resources than alternatives A and C, but less than Alternative B, by reducing soil compaction and accelerated erosion.

Alternative D authorizes the use of structural projects only pursuant to a Comprehensive Grazing Strategy to make progress toward PFC and Wyoming Standards for Healthy Rangelands, whereas Alternative B relies on passive solutions. If properly applied, Alternative D management, like Alternative C, would yield the fastest results in riparian-wetlands improvement; however the potential for adverse impacts to soil and vegetation, and therefore water resources, would also be greater because much more intensive grazing would be likely.

Although Alternative D would disturb fewer acres from range improvement projects than alternatives A and C, the beneficial impacts of improved riparian-wetland health could be offset by adverse impacts to soil from creating livestock concentration zones associated with range developments and increasing use of available natural water sources. These impacts could exceed the beneficial impacts from riparian-wetland improvement. Loss of vegetation in uplands areas could contribute to degradation of water resources, which would have more adverse impacts to water resources than the beneficial impacts from improved riparian-wetland condition. In addition, range improvements would still emphasize infrastructure projects, so there would be fewer acres of vegetative treatments and fewer projects, such as aspen and willow regeneration, that would beneficially impact water resources.

Roads and trails are prime locations for soil compaction and accelerated erosion, and the fewer acres open to traffic, the less chance for damage to soil resources. Comprehensive trails and travel management under Alternative D is similar to, but less protective than, Alternative B. Alternatives B and D close areas to over-snow vehicle use on snow less than 12 inches deep and would result in the same beneficial impacts to soil resources, and long-term beneficial impacts to water resources. Neither Alternative A nor C has a minimum snow-depth requirement, and would result in more long-term adverse impacts to water resources, although all alternatives limit OHV utilization.

4.1.4.3.5.4. Special Designations

Alternative D management of Congressionally Designated Trails would result in more beneficial impacts to water resources than Alternative A, substantially more than Alternative C, and substantially less than Alternative B, again because of limits on surface disturbance in connection with lands around Congressionally Designated Trails. On a site-specific basis, the actual number of acres on which soil disturbance would be limited would depend on factors such as visual resources and impacts to the settings of the trails.

Management of NWSRS-eligible waterway segments would be slightly less beneficial to water resources under Alternative D than under alternatives A and B. However, most of the eligible waterways not managed as suitable under Alternative D have other protective management, such as ACEC designation or WSA protections, that would limit surface disturbance that could adversely impact water resources.

Alternative D designates 245,037 acres of ACECs that have surface disturbance limitations as part of the protection of ACEC values. This management would beneficially impact water resources, but less so than Alternative B. Alternative C affords no similar protections.

4.1.5. Cave and Karst Resources

No significant caves have been identified in the planning area. However, there has been no survey of cave and karst resources. Therefore, potential impacts to cave and karst resources under the alternatives can be described only in theoretical terms.

Adverse impacts to cave and karst systems result from management actions that alter, degrade, or destroy cave or karst systems and their features. Conversely, actions that result in data collection and preservation or establishment of cave and karst resources and their associated geological, biological, cultural, paleontological, hydrological, and/or educational values are considered beneficial impacts. Special designations such as the Lander Slope ACEC would protect cave and karst resources in that area.

Direct impacts to cave and karst resources result from management actions that physically alter, damage, or destroy cave and karst systems, including their associated geologic features (speleothems) and biologic communities. In general, recreational uses of caves have the greatest potential to result in direct adverse impacts to cave and karst resources.

Indirect impacts to cave and karst systems can result from actions that increase the accessibility of cave and karst areas, and therefore the probability of adverse impacts due to incompatible or excessive recreational use. Indirect impacts can also result from activities that alter water quality (e.g., agriculture, pesticide application, and pollution) when degraded water infiltrates into groundwater, thereby possibly altering the chemical and biological environment of cave and karst systems.

Under all alternatives, if cave and karst resources protected by federal legislation were discovered, the BLM would specially manage those areas under a protocol developed to meet preservation needs.

4.1.6. Lands with Wilderness Characteristics

4.1.6.1. Summary of Impacts

Consistent with the Federal Land Policy and Management Act (FLPMA), the BLM evaluates lands in the planning area to determine if they contain wilderness characteristics that should be managed to maintain and protect those characteristics. As Table 4.13, “Acres of the Planning Area Managed to Protect Wilderness Characteristics” (p. 611) demonstrates, Alternative B would benefit lands with wilderness characteristics the most out of the four alternatives, as it allocates the highest amount of acres to be managed as non-WSA lands with wilderness character to protect these wilderness values. Alternatives A and C do not specially manage lands with wilderness characteristics and could result in degradation of these areas. Alternative D allocates 536 fewer acres as non-WSA lands with wilderness character than Alternative B.

Table 4.13. Acres of the Planning Area Managed to Protect Wilderness Characteristics

Area	Alternative A	Alternative B	Alternative C	Alternative D
Little Red Creek Complex	0	5,490 acres[1]	0	4,954 acres[1]

Source: BLM 2009a

[1] Alternatives B and D manage lands with wilderness characteristics as non-WSA land with wilderness characteristics to protect the areas’ wilderness character.

4.1.6.2. Methods and Assumptions

This section focuses on analyzing potential impacts to the 5,490 acres in the Little Red Creek Complex found to have wilderness characteristics, as discussed in Chapter 2. The *Recreation* and *Visual Resources* sections address impacts throughout the planning area to naturalness, solitude, and primitive/unconfined recreation. The following indicators and definitions are used in this analysis of lands with wilderness characteristics:

> **Naturalness:** The degree to which an area generally appears to have been affected primarily by the forces of nature with the imprint of people's work substantially unnoticeable. It is not synonymous with natural integrity.
>
> **Solitude:** The state of being alone or remote from others; isolation. A lonely or secluded place.
>
> **Primitive and Unconfined Recreation:** Nonmotorized, nonmechanized (except as provided by law), and undeveloped types of recreational activities.

Assumptions used in this impact analysis include the following:

- Closing areas to motorized vehicles will increase the protection of solitude and primitive/unconfined recreation. Limiting motorized vehicles to designated roads and trails, and seasonal closures will increase the protection of solitude and primitive/unconfined recreation at a lower level then a year-round closure. Limiting vehicles to existing roads and trails will not protect solitude and primitive/unconfined recreation.
- Managing areas as VRM Class II visual resources will increase the protection of naturalness and primitive/unconfined recreation. Managing areas at a lower VRM Class will result in impacts to naturalness and primitive/unconfined recreation.
- Designating an area as non-WSA land with wilderness characteristics will benefit naturalness and primitive/unconfined recreation.
- ACEC management will benefit lands with wilderness characteristics because often, management prescriptions for ACECs associated with relevant and important values (e.g., scenic, wildlife, and geologic) benefit naturalness and solitude and primitive/unconfined recreation.
- This analysis only considers present conditions when considering lands with wilderness characteristics and not the potential for other areas to become lands with wilderness characteristics through restoration or other changes in current condition.

4.1.6.3. Detailed Analysis of Alternatives

4.1.6.3.1. Impacts Common to All Alternatives

Consistent with FLPMA, the BLM evaluates lands in the planning area to determine if they contain wilderness characteristics that should be managed to support and/or enhance those characteristics. The inventory conducted by the BLM as part of the RMP process to evaluate lands with wilderness characteristics is identified in Chapter 3. Only lands in Dubois, known as the Little Red Creek Complex, contained lands with wilderness characteristics. Consistent with the FLPMA and the BLM Land Use Planning Handbook, analysis of the impacts of the alternatives addresses management of the Little Red Creek Complex and does not revisit the decisions with regard to other areas found not to contain wilderness characteristics.

A small portion of the Little Red Creek Complex is open to livestock grazing in all alternatives, but grazing use is not expected to adversely impact wilderness characteristics.

Alternative C does not designate any area as an ACEC, including the Whiskey Mountain ACEC that was designated in the 1987 RMP. However, for clarity, this geographic area is referred to as the Whiskey Mountain ACEC in all alternatives, even Alternative C.

4.1.6.3.2. Alternative A

4.1.6.3.2.1. Program Management

Alternative A does not manage the Little Red Creek Complex as non-WSA land with wilderness characteristics. The alternative does not prescribe management actions to enhance or maintain the wilderness characteristics of the area. This management would result in impacts to wilderness characteristics from other programs because mitigation actions and proactive management will focus on enhancing the area for other resources (primarily wildlife). These impacts will be somewhat offset by the fact that benefits to wildlife often benefit wilderness characteristics.

4.1.6.3.2.2. Resources

This alternative manages the Little Red Creek Complex as VRM Classes II, III, and IV. This would allow for modifications to the visual environment that would increase visual intrusions and the evidence of human presence in VRM Class III and IV areas.

4.1.6.3.2.3. Resource Uses

Alternative A limits resource uses in the Little Red Creek Complex to support Whiskey Mountain ACEC management for the benefit of bighorn sheep (see below under *Special Designations*). This management will enhance and support wilderness characteristics of the area by limiting surface disturbance and the intrusion of human presence. However, outside of the ACEC, there are no limits on mineral extraction or realty actions. Resource uses can result in increased road densities, visual intrusions, unnatural sounds, evidence of humans, and social crowding. Except for ACEC management, this alternative does not limit resource use with the potential for adverse impacts to wilderness values. Although the mineral potential is low, the demand for ROWs to access the Shoshone National Forest may lead to adverse impacts to the area's wilderness values.

This alternative will continue to allow motorized vehicles in the area. Travel management decisions for the ACEC will beneficially impact wilderness values (see below). Because the travel management focus will not be on enhancing wilderness characteristics, it is assumed that this decision would moderately benefit naturalness, but would not benefit solitude and primitive/unconfined recreation.

Alternative A does not include specific recreation management for the Little Red Creek Complex. Therefore impacts from social trails, crowding, and other recreation-related activities would continue in the area. These impacts would reduce all wilderness characteristics during the planning period.

4.1.6.3.2.4. Special Designations

Managing the majority of the area as an ACEC would beneficially impact naturalness and would result in limited beneficial impacts to solitude and opportunities for primitive/unconfined recreation. ACEC management prescribes limits on resource uses, directly limiting the amount of change that can occur to the landscape. The ACEC designation and supporting management would primarily limit energy development in the Little Red Creek Complex, which would reduce the potential for visual intrusions, unnatural sounds, evidence of humans, and social crowding. Travel management limits motorized travel to designated roads and provides seasonal closures for the benefit of bighorn sheep, which would beneficially impact the wilderness characteristics of the area.

4.1.6.3.3. Alternative B

4.1.6.3.3.1. Program Management

Alternative B would enhance wilderness characteristics on 5,490 acres of the Little Red Creek Complex. By managing the area as non-WSA land with wilderness characteristics, management actions will sustain and enhance the wilderness characteristics of the area. Program management under this alternative closes the area to motorized vehicles and manages the area as VRM Class II. In addition, the alternative explicitly manages recreation to sustain and enhance wilderness characteristics. Alternative B program management will close all roads in the area; provide management that precludes visual intrusions and unnatural sounds; reduce the evidence of human presence; and apply a management framework to reduce social crowding. These program decisions would complement ACEC management in the area. The synergy of the ACEC designation and management of the area as non-WSA land with wilderness characteristics would result in an area with a high degree of naturalness, solitude, and opportunities for primitive/unconfined recreation.

4.1.6.3.3.2. Resources

Alternative B air, soil, water, and wildlife management beneficially impacts the Little Red Creek Complex by limiting surface disturbance and intrusion of human presence. Compared to Alternative A, this management would reduce the probability of visual intrusions and evidence of human presence in the area, and would enhance wilderness characteristics over a larger area.

4.1.6.3.3.3. Resource Uses

Alternative B mineral and realty management beneficially impacts the Little Red Creek Complex by limiting surface disturbance and visual/human intrusions. Although mineral potential is low, the area and other lands nearby have high potential for wind-energy development. Alternative B restrictions on ROWs will preclude development of access to the Shoshone National Forest which would adversely impact the wilderness characteristics. VRM is more beneficial than under Alternative A since the area around the Little Red Creek Complex is managed as VRM Class II, which further limits disturbance and human presence.

Resource uses can result in increased road densities, visual intrusions, unnatural sounds, evidence of human presence, and social crowding. This alternative specifically closes the area to motorized vehicle use, which would enhance wilderness characteristics.

Alternative B manages recreation use in lands with wilderness characteristics to maintain naturalness, solitude, and primitive/unconfined recreation. This management would ensure future recreation management actions support wilderness characteristics by not allowing motorized or mechanized travel in the Little Red Creek Complex. In addition, this alternative pursues foot and horseback access to this area to support primitive and unconfined recreation. These actions would enhance wilderness characteristics throughout the planning period, and would beneficially impact wilderness characteristics more than Alternative A.

4.1.6.3.3.4. Special Designations

Managing the majority of the Little Red Creek Complex as an ACEC would result in beneficial impacts similar to Alternative A. The synergistic effect of ACEC and wilderness characteristics management would result in an area with a high degree of naturalness, solitude, and opportunities for primitive/unconfined recreation.

4.1.6.3.4. Alternative C

4.1.6.3.4.1. Program Management

Alternative C does not manage any area as non-WSA land with wilderness characteristics or provide other specific management for lands with wilderness characteristics. The impacts from program management of the Little Red Creek Complex under Alternative C is similar to that under Alternative A.

4.1.6.3.4.2. Resources

Alternative C air, soil, water, and wildlife management is less protective than Alternative A and thus has fewer beneficial impacts to wilderness characteristics. These resources are managed with standard stipulations which would allow more surface disturbance which would reduce the wilderness characteristics of the area.

Alternative C manages the Little Red Creek Complex (including the Whiskey Mountain ACEC) as VRM Classes III and IV. This management would allow for modifications to the visual environment that would increase visual intrusions and evidence of human presence in the area. Because this alternative does not include VRM Class II management for the complex, adverse impacts from modifications to the visual environment would be higher under Alternative C than under Alternative A.

4.1.6.3.4.3. Resource Uses

This alternative does not limit resource uses such as mineral development or realty actions in the Little Red Creek Complex, including the Whiskey Mountain ACEC. Therefore, activities in support of resource uses would increase in the area compared to Alternative A, including: road densities, visual intrusions, unnatural sounds, evidence of human presence, and social crowding. Mineral and realty actions in the area would be authorized with adverse impacts to the solitude and undisturbed character of the area. Although there is limited potential for minerals in the area, demand for ROWs to access the Shoshone National Forest could lead to disturbances which would adversely impact wilderness characteristics.

Alternative C places fewer restrictions on motorized vehicles in the area than Alternative A. Travel management decisions for the area would limit motorized travel to existing roads and trails. Because the travel management focus is not on enhancing wilderness characteristics or ACEC values, compared to Alternative A, Alternative C management would decrease naturalness, solitude, and primitive/unconfined recreation in the area.

This alternative does not include specific recreation management for the area; therefore, impacts from social trails, crowding, and other recreation-related activities would continue in the area. These impacts would reduce all wilderness characteristics during the planning period. Because Alternative A includes the area as part of an ACEC, impacts from recreation would be limited under Alternative A to protect relevant and important values of the ACEC. Alternative C does not include this area in an ACEC; therefore, Alternative C would result in more impacts from recreation than Alternative A. This would decrease wilderness characteristics, resulting in adverse impacts.

4.1.6.3.4.4. Special Designations

Alternative C does not designate the Whiskey Mountain ACEC and manages the area with standard stipulations which allow mineral and realty actions and includes less restrictive travel management decisions for the area, both of which would result in increased road densities, visual intrusions, unnatural sounds, evidence of human presence, and social crowding compared to Alternative A. These increases would result in an overall loss of wilderness characteristics in this area.

4.1.6.3.5. Alternative D

4.1.6.3.5.1. Program Management

Management under Alternative D is similar to Alternative B, with slightly less acreage (4,954 acres) managed as non-WSA land with wilderness characteristics. The boundary in this alternative is more contiguous with the Fitzpatrick Wilderness Area boundary which was accomplished by adjusting the portion of the Little Red Creek Complex managed as non-WSA land with wilderness characteristics to follow a primitive road that is also used as the boundary of the Fitzpatrick Wilderness Area.

4.1.6.3.5.2. Resources

Alternative D impacts to lands with wilderness characteristics from resources management would be the same as Alternative B. Air, water, soil, and riparian-wetland management limits surface disturbance which beneficially impacts wilderness. Wildlife management protects habitat from surface disturbance, disruptive activities, and closes the entire Dubois area to oil and gas leasing because of wildlife resources, particularly threatened and endangered species. These protections for other resources would beneficially impact the wilderness characteristics of the Little Red Creek Complex.

4.1.6.3.5.3. Resource Uses

Alternative D impacts to lands with wilderness characteristics from resource uses would be the same as Alternative B since realty and mineral actions are sharply curtailed or prohibited in the general Dubois area and the area around the Little Red Creek Complex. Both alternatives B and D would beneficially impact wilderness characteristics and limit or prohibit human intrusions.

4.1.6.3.5.4. Special Designations

Alternative D impacts to lands with wilderness characteristics from special designations would be the same as Alternative B, which is far more beneficial to wilderness characteristics than Alternative C and moderately more than Alternative A.

4.2. Mineral Resources

4.2.1. Locatable Minerals

Locatable minerals are minerals obtained on public lands by way of "locating" a mining claim. In many cases, such minerals are metallic in nature and because of the geologic environments in which they are generally found, locatable minerals are also referred to as "hard rock" minerals. Some metallic locatable minerals occur in placer deposits, like in sand and gravels near streams and rivers. Some non-metallic minerals are locatable too, including bentonite and gypsum (BLM 2009c). Mill sites and tunnel sites can also be located on lands open to mineral entry (see 43 CFR Part 3832 Subparts C and D). The authority for exploiting locatable minerals is in the General Mining Law of 1872 (as amended), which allows for the location of lode and placer mining claims and includes a prescription for patents (see 43 CFR Part 3860; mill sites may also qualify for patent; no funds have been appropriated for the processing of patent applications since October 1, 1994). Whether a claim to a locatable mineral is entitled to a patent depends on such factors as quality, quantity, mineability, demand, and marketability. The law encourages claimants to initiate exploration and development, stating that "...all valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and purchase..."

4.2.1.1. Summary of Impacts

Because of the legal prescriptions in the General Mining Law, the federal government has limited ability to manage where locatable minerals are obtained unless the BLM withdraws those lands from mineral development. Segregation from the mining law or a mineral withdrawal (both subject to valid existing rights; see more about valid existing rights in *Methods and Assumptions*) removes certain public lands from location and entry under the General Mining Law. Mineral withdrawals and issues related to protected resources would result in long-term adverse impacts to locatable mineral resources.

Over time, the method by which lands are made unavailable to locatable mineral activities has changed. Before the enactment of the FLPMA in 1976, a number of different processes were followed that resulted in the closure of lands to locatable mineral activities. There are existing pre-FLPMA withdrawals (technically identified as segregations) that do not expire. They were designated by Congress or other entities and are not within BLM authority to modify. Some are for cultural, historical, or recreation purposes and others are to meet the requirements of other entities such as the U.S. Department of Energy. These properties are unavailable for locatable mineral actions under all alternatives since they do not result from RMP decisions. The acreage associated with these pre-FLPMA withdrawals are not included in the analysis of areas that are open or closed to locatable mineral activities. Also common to all alternatives is the withdrawal for the protection of desert yellowhead (Yermo) habitat which is a threatened and endangered species found only in the planning area. The pre-FLPMA and desert yellowhead withdrawals include 8,634 acres.

Under regulations in effect in 2010, RMPs identify lands for segregation. This is a different use of the word "segregation" that was in effect before passage of the FLPMA. Lands are segregated, or not available, for mineral entry for a period not to exceed two years while the BLM pursues the withdrawal action. The process following the RMP segregation involves additional public notice and opportunities for commenting and extensive additional Washington level review. A segregation of more than 5,000 acres requires Secretarial approval. Once in place, a withdrawal is effective for no more than 20 years and does not affect existing claims. Claims that expire during the 2-year segregation period or the 20-year withdrawal period become subject to the terms of the withdrawal and are no longer available for claims.

For clarity, the lands that are identified for mineral withdrawal pursual are described in this document as "withdrawn". This nomenclature does not imply that the lands will be withdrawn on signing of the RMP Record of Decision (ROD). The actual withdrawal process is lengthy and the BLM may not be successful in having the lands withdrawn. However, in order to make it possible to compare the alternatives, the following analysis assumes that withdrawal will be achieved for the acres identified as "withdrawn". To the extent that withdrawal is not achieved, then the impacts to resources described in Alternative C would occur.

Management actions related to wildlife protection that could adversely impact locatable minerals are actions that affect timing or result in delays to operators; these would be short-term impacts. For this planning effort, impacts would primarily be economic because, for example, there might be certain times of the year when surface-disturbing activities would not be allowed, or there might be times when exploration activity would not be allowed within a certain distance from a specific wildlife habitat. The BLM does not manage to avoid adverse economic impacts to project proponents, but manages on behalf of those resources under its mandate. While the BLM does not consider cost irrelevant in this or any other program, the BLM is not obligated to select the alternative that is most profitable to the applicant. FLPMA requires analysis of socioeconomic impacts to the local economy.

Finally, there are special status areas that impact locatable minerals which include the designation of ACECs, NWSRS-eligible waterway segments managed as suitable WSRs, areas designated as "closed" to cross-country travel (as defined in 43 CFR 8340.0-5), any lands or waters known to contain federally proposed or listed threatened or endangered species or their proposed or designated habitat (unless BLM allows for other action under a formal land use plan or threatened and endangered species recovery plan), and National Monument and National Conservation areas administered by the BLM (43 CFR 3809.11). In these areas, disturbances associated with locatable mineral exploration or mining are allowed, but must be performed under a Plan of Operations, as defined under the 43 CFR Subpart 3809 Surface Management Regulations, without regard to the size of the disturbance. Because preparing a Plan of Operations expends time and money and potential mitigative prescriptions could make operations more expensive or time consuming, the impacts would be primarily short-term. Requiring a Plan of Operations is not considered to be an adverse environmental impact.

Table 4.14, "Acres of Subsurface Mineral Estate Closed to Locatable Minerals (Segregation and Withdrawals)" (p. 619) provides the acres of mineral estate currently withdrawn and proposed for withdrawal from locatable mineral entry. Through a variety of mechanisms that have changed over time, federal minerals can be unavailable to operation under different mining laws (BLM 2009c). Sometimes the mechanism is closure, sometimes segregation, and under current law, segregation while withdrawal is pursued. These mechanisms vary by type of mineral and mining law. For convenience, the phrase “closed to locatable minerals” is used to encompass the various mechanisms that are utilized to make the minerals unavailable. All alternatives have timing restrictions, including wildlife and travel management limits. The BLM generally applies these only to exploratory activities because once mining development begins, it is generally not feasible to seasonally limit a mining operation without interfering with a claimant's statutory right to mine. For in situ recovery (ISR) extraction of uranium, for example, stopping operations seasonally would likely cause complications to the mining process that could prevent full recovery of the uranium. In addition to lands formally withdrawn from mineral entry, when lands are sold or exchanged under the Small Tracts Act, Recreation and Public Purposes (R&PP) Act, 43 United States Code (U.S.C.) 1713 and 1716, the minerals reserved to the U.S. continue to be removed from operations of the mining laws unless a subsequent land use planning decision expressly restores the land to mineral entry (43 CFR 3809.2[a]).

The BLM expects that the historic (1989 through 2009) average within the planning area of 13.5 acres of short-term surface disturbance per year and 95 acres of long-term disturbance to continue under all alternatives. Although the acres of land closed to pursue locatable mineral entry withdrawal varies by alternative, that management action would not impact valid existing claims. Therefore, the BLM expects these claims will be developed in accordance with historic patterns. Although the historic pattern does not include the years of high levels of uranium development, it does include substantial amounts of uranium exploration. Actual mining could result, depending on unknown commodity pricing. At present, the Lander Field Office is evaluating one mine.

Table 4.14. Acres of Subsurface Mineral Estate Closed to Locatable Minerals (Segregation and Withdrawals)

Alternative A	Alternative B	Alternative C	Alternative D
23,114	1,632,605	0	42,885
Source: BLM 2009a			

Alternatives A, B, and D would retain existing withdrawals including seeking renewal as the withdrawal period expires. Alternative C would allow existing renewals to expire. Alternative B identifies the greatest amount of acres for new locatable mineral withdrawals (in accordance with the requirements necessary following RMP implementation), followed by Alternative D, then A and then C. Similarly, Alternative B also has the greatest amount of acres that have a requirement for a Plan of Operations (ACECs, WSRs, areas closed to motorized vehicle travel, proposed or designated threatened and endangered species habitat, and National Monuments and Conservation areas) followed by alternatives D, A, and C (Table 2.3, “Comparative Summary of Proposed Land Use Decisions in the Lander Planning Area” (p. 32) and Table 2.4, “Comparative Summary of Areas of Critical Environmental Concern by Alternative” (p. 37)). Alternative C does not designate any ACECs or manage NWSRS-eligible waterway segments to maintain their suitability and 5,472 acres are closed to motorized vehicle travel (451 acres less than Alternative A). Over time, as the existing mineral withdrawals expire, even more lands will be available for locatable mineral development.

Note: the presence of mining claims is an indicator of interest in the locatable mineral estate. A claim that pre-dates a withdrawal or segregation may continue to be maintained. However, if the claimant files a 3809 notice or Plan of Operations after the date of withdrawal the BLM is obligated to prepare a mineral examination report in accordance with 43 CFR 3809.100(a); the

BLM may prepare such a report if the land has been segregated as per advice rendered in BLM Washington Office Instruction Memorandum (IM) 2010-088.

4.2.1.2. Methods and Assumptions

The region of analysis is the entire mineral estate under the jurisdiction of the Lander Field Office, including split-estate where the surface may be fee but federal minerals are reserved in the subsurface estate. The analysis conducted with respect to locatable minerals is primarily qualitative because of a lack of details and because of certain provisions of the mining law. First, a mining claimant has a statutory right to obtain locatable minerals. Second, other than proving certain activities conducted by a claimant meet the threshold of "unnecessary or undue degradation," there are very few management actions that can be taken that materially affect when and where casual use, notice and Plan of Operations level operations pursuant to the 43 CFR Subpart 3809 regulations may take place on lands open to mineral entry.

Methods and assumptions used in this impact analysis include the following:

- Because of the statutory right to locate mining claims and explore for and develop locatable mineral resources, direct closures to locatable mineral activity can only occur through a mineral withdrawal or segregation (subject to valid existing rights).
- The use/occupancy regulations at 43 CFR 3715 and the surface management regulations at 43 CFR 3809 (outside WSAs) and 43 CFR 3802 (within WSAs), apply to all surface-disturbing activities for locatable minerals.
- Lands not formally withdrawn or segregated from mineral entry will be available for the location of claims and sites, exploration, and development as per the regulations at 43 CFR Subpart 3830 and 43 CFR Subpart 3809.
- The BLM generally approves a Plan of Operations and modifications thereto that meet all applicable statutory and regulatory requirements and would not cause unnecessary or undue degradation per 43 CFR 3809 and would not impair wilderness characteristics as per the 43 CFR 3802 regulations. The Authorized Officer may disapprove or withhold approval of a plan as per the provisions of 3809.411(d)(3).
- Locatable mineral operators may not knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains or any historical or archeological site, structure, building, or object on federal lands. This and other performance standards that are found at 43 CFR 3809.420 apply to Notices and Plans of Operation filed on or after January 20, 2001 or modifications thereto. Failure to comply with any performance standard constitutes unnecessary or undue degradation.
- Notice-level activities (i.e., exploration that disturbs 5 acres or less or involves bulk sampling less than 1,000 tons) do not require approval from the BLM (i.e., they are not considered a federal action and also therefore require no NEPA analysis), but are still subject to the performance standards at §3809.420, including statutory restrictions due to cultural concerns (National Historic Preservation Act [NHPA]), the Endangered Species Act (ESA), and the requirement under FLPMA to prevent unnecessary or undue degradation of public lands.
- A Plan of Operations must be submitted and approved by the BLM for exploration causing more than 5 acres disturbance, the removal of bulk samples of 1,000 tons or more, or for surface-disturbing activities greater than casual use in special status areas such as designated ACECs, areas closed to cross-country vehicle use, etc.; see 43 CFR 3809.11(c).
- Withdrawals are discussed in context of a locatable mineral resource use because they would be or have been withdrawn from operations under the general mining law; i.e., location of claims and sites as well any level of operations under 43 CFR subpart 3809 – absent a

pre-existing claim are or would be precluded. Withdrawals may affect other land and mineral laws. Proposed withdrawals are processed as a lands and realty action pursuant to 43 CFR subpart 2310.

- Pre-FLPMA withdrawals issued pursuant to the provisions of the Pickett Act do not apply to metalliferrous minerals (e.g., gold, silver, copper, lead, iron, uranium, etc.). Therefore these minerals are open to location unless a subsequent withdrawal closed the land to their location.
- Except for Alternative C, all existing pre-FLPMA mineral withdrawals would continue indefinitely.
- Locatable mineral activity in the planning area would continue at a level similar to what has transpired over the last 20 years (1989-2009).
- Known areas of precious gold mineralization are primarily located at South Pass, near Goat Mountain in the Rattlesnake Mountains, the Copper Mountains, and in the Granite Mountains at Tin Cup. Based on data available at the time of preparing the Mineral Occurrence and Development Potential Report (BLM 2009c), the occurrence potential for precious metals in the planning area is assigned a rating of M/D. The mineral potential classification system is based on the level of potential and the level of certainty of data supporting the possible existence of minerals. The system classifies level of potential as No (O), Low (L), Moderate (M), High (H), and Not Determined (ND). The system classifies level of certainty as A (lowest certainty), B, C, and D (highest certainty). See the Mineral Occurrence and Development Potential Report (BLM 2009c) or BLM Manual 3031, Energy and Mineral Resource Assessment for more information on the mineral potential classification system.
- Based on data available at the time of preparing the Mineral Occurrence and Development Potential Report (BLM 2009c), the occurrence potential for base metals deposits in the planning area is assigned a rating of L/C.
- Based on data available at the time of preparing the Mineral Occurrence and Development Potential Report (BLM 2009c), the occurrence potential for bentonite in the planning area is assigned a rating of M/C. This is based on the fact that the evidence existing thus far indicates some favorable geologic environments but little evidence to quantify how much is available and at what grade.
- Based on data available at the time of preparing the Mineral Occurrence and Development Potential Report (BLM 2009c), the occurrence potential for uranium in the planning area is assigned a rating of H/D. The development potential for uranium is assigned a rating of moderate to high, with a tendency to a high rating if market prices remain favorable.
- Due to low interest, and low occurrence potential, gemstones and other lapidary material are not evaluated. Although historical interest in jade in the planning area has been high, no current demand has been identified (BLM 2009c).
- Although discoveries of other valuable deposits of locatable minerals may occur during the planning period, principally uranium and to a lesser degree, gold and bentonite (in that order) will remain the dominant locatable minerals of interest with potential commercial mining in the planning area. See the Mineral Occurrence and Development Potential Report (BLM 2009c) for more information on the occurrence and development potential for locatable minerals within the planning area.
- However, RMP decisions do not withdraw lands from the operation of the General Mining Law; additional processes are required that include analysis of the minerals occurring and other factors. This process is not within the control of the Lander Field Office and may not result in withdrawal of the lands. For purposes of analysis, all alternatives assume that lands closed to pursue withdrawal under that alternative, if any, will result in withdrawal.

If there is no identifiable impact from a particular resource, resource use or special designation, the topic is not discussed.

4.2.1.3. Detailed Analysis of Alternatives

4.2.1.3.1. Impacts Common to All Alternatives

Program Management

All alternatives include restrictions on authorized activities, but the degree of the restrictions varies by alternative. However, because of rights granted to those who stake locatable minerals and comply with the requirements of the General Mining Law and federal regulations, many of these restrictions do not apply to those claims. All alternatives apply the requirements of the cultural resources program and environmental protections, including the CWA, the CAA, and the ESA, to locatable minerals, and because they do not vary by alternative, they are not further analyzed as an adverse impact to locatable minerals.

Under all alternatives, surface-disturbing activities related to locatable mineral prospecting and development are subject to site-specific analysis before approval. The BLM is obligated to prevent undue or unnecessary degradation (43 CFR 3809.1[a]), but this assessment can be done only at a site-specific level, not in a land use plan. Limitations in the land use plan other than withdrawals do not apply to casual use (nonmechanized mining activities). 43 CFR 3809.420 identifies performance standards for locatable mineral activity under notices and Plans of Operation, but these standards are essentially BMPs designed to help operators avoid unnecessary or undue degradation, which may add cost and time to a claimant's operation and do not vary by alternative.

Mining claimants or operators must file a Plan of Operations and obtain BLM approval before beginning operations that constitute more than casual use in special status areas, or for exploration causing more than 5 acres of disturbance or the removal of bulk samples of 1,000 tons or more. The requirement of a Plan of Operations is not considered an adverse impact because such plans do not preclude development.

Limitations on surface disturbance to protect other resources, vary by alternative and are applied, to a limited extent to locatable mineral exploration. Mitigation and site-specific reclamation measures could prescribe certain activities or mitigation that could reduce the economic viability of a mining proposal (e.g., the application of standard mitigation guidelines such as slope restrictions and riparian-wetland setbacks, and timing restrictions to protect BLM-sensitive wildlife species). These limitations do not preclude development if needed to fully develop the mineral, which would be part of the analysis in the Plan of Operations. While the limitations are applied to exploration with a potential increase in cost, the limitations do not adversely impact exploration because it is likely that the BLM would allow the exploration despite the surface disturbance limitations if the applicant could establish the necessity for that entry.

Resources

Management to protect riparian-wetlands varies by alternative. Under Alternative B, surface-disturbing activities are prohibited within 1,320 feet of surface water, riparian-wetland areas, playas, and 100-year floodplains, where mapped; under alternatives A and C these activities require a 500-foot setback. However, there is little, if any, resulting difference in impacts to locatable minerals as a result of these differences because they do not apply to locatable minerals except in very rare cases when it is determined that without such a restriction, unnecessary or undue degradation would result.

Wildlife restrictions on development of locatable minerals can adversely impact exploration and development activities when seasonal timing limitations apply. The BLM anticipates that the intensity of impacts would vary by alternative and be proportional to the actual demand. It follows that adverse impacts to locatable minerals are potentially greater when there are restrictions on areas with high occurrence or potential than when there are restrictions in areas of moderate to low occurrence or potential.

All alternatives maintain the minerals withdrawal to protect critical habitat for desert yellowhead, a threatened and endangered plant species. Although this would normally adversely impact the minerals program, it would result in little if any adverse impact because of the size and location of the withdrawal. Because the desert yellowhead is unique, the BLM determined that it would be unreasonable for any alternative to consider allowing the withdrawal for critical habitat to expire.

Timing limitations related to wildlife generally apply to exploration activities only and not mining development, although there could be certain operations under a mining plan that can be deferred to a time when there are fewer adverse impacts to other resources or uses. There could be a cost associated with the prohibition of certain activities (e.g., surface-disturbing or disruptive) during certain times of year due to unavailability of workforce, higher maintenance costs, or inclement weather, which would be proportional to the relative amounts or surface under those stipulations. For example, delaying a drilling exploration program in greater sage-grouse habitat until after greater sage-grouse brood-rearing season could incur additional costs to the operator but at another time would still allow an operator to gather the data required to evaluate a potential resource while still mitigating the impacts of the disturbance. Conversely, drilling through the brooding season could be deemed unnecessary or undue.

Such timing limitations, would not apply to the mining phase because the efficient extraction of the resource could require the operator to mine through habitat. For a variety of reasons, the mine would likely operate 24 hours a day, 365 days a year, and as stated earlier, the extraction of the resource is not unnecessary or undue.

Resource Uses

No alternative precludes development unless the level of disturbance rises to the level of unnecessary or undue degradation regardless of the acreage affected. While mining a resource is not generally considered unnecessary or undue, the particular methods used and the failure to adhere to certain performance standards in exploration and mining phases could preclude development if deemed unnecessary or undue.

Management actions common to all alternatives that adversely impact locatable minerals include continuing to manage all pre-FLPMA withdrawals (at the time called “segregations,” although that term now means something else) in the locatable minerals program. The BLM does not have the authority to modify these withdrawals; therefore, the withdrawals do not vary by alternative and are not further addressed here.

Withdrawals are summarized in Table 4.15, “Acreage of Withdrawals for the Benefit of Habitat, Cultural or Recreational Values” (p. 624) below. All alternatives withdraw some portion of the South Pass area, East Fork, Warm Springs, Green Mountain recreation sites, and Castle Gardens from locatable mineral entry based on pre-FLPMA actions. Although an adverse impact to locatable minerals, this management does not vary by alternative because the withdrawals were established by Congressional action and cannot be changed in the land use plan. Alternative B expands the areas withdrawn. There is little mineral occurrence in these areas except for in South Pass because there is a low coincidence of mineral occurrences with existing withdrawals and withdrawals recognize and preserve valid existing rights.

Table 4.15. Acreage of Withdrawals for the Benefit of Habitat, Cultural or Recreational Values

Purpose	Alternative A	Alternative B	Alternative C	Alternative D
Habitat protection	21,862	1,482,580	0	36,928
Cultural or paleontological value protection	927	563,640	0	2,688
Recreation or visual values and/or visitor protection	355	169,774	0	4,380
Source: BLM 2009a				

Beneficial impacts to locatable minerals result from management actions that open access to federal locatable minerals, including allowing withdrawals or segregations to expire without seeking new withdrawals. Therefore, alternatives that do not extend expiring withdrawals or segregations would be more beneficial to locatable minerals than those that renew those withdrawals, which adversely impact locatable minerals.

Trails and travel management decisions can add costs to development by requiring a Plan of Operations if the area is closed to motorized vehicles (and claim staking would need to be done on foot unless an administrative exception were authorized). The route of access across public lands (that are open to mineral entry) to areas of locatable mineral exploration or mining can be addressed by the operator in their Notice or Plan of Operations (public lands being crossed must be open to mineral entry and the acreage of constructed-improved access is included in the total project acreage) or be included in an application for a ROW. The BLM can, however, designate access routes to avoid unnecessary or undue degradation. Table 4.16, “Areas and Acreage Closed to Motorized Travel” (p. 624) shows areas requiring a Plan of Operations because of closure to motor vehicle travel. Timing limitations related to travel management, generally apply to exploration activities only and not mining development for reasons described earlier for wildlife timing restrictions.

Table 4.16. Areas and Acreage Closed to Motorized Travel

Purpose and area	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
Wildlife: Whiskey Mountain	0	6,010	0	0
Soils/viewshed: Dubois Badlands	4,903	4,903	0	4,761
Cultural: Castle Garden	78	78	0	78
Wilderness: Copper Mountain, Dubois Badlands, Lankin Dome, Miller Spring, Savage Peak, Split Rock, Sweetwater Canyon, Whiskey Mountain	0	55,338	0	12,016
Recreation: The Bus @ Baldwin Creek, Dubois Mill, Johnny Behind the Rocks/Blue Ridge, Sinks Canyon climbing area	0	7,500	0	5,195
Lands with wilderness characteristics: Little Red Creek Complex	0	5,491	0	5,490
Wild and scenic designations: Baldwin Creek Canyon	0	2,349	0	2,349

Purpose and area	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
Wild and scenic designations: Sweetwater Canyon	0	9,135	0	0
Totals	**4,981**	**85,310**	**0**	**29,889**
Source: BLM 2009a WSA Wilderness Study Area				

Special Designations

Under all alternatives, WSA acres and prescriptions are the same and not further analyzed in this document, although WSA management results in adverse impacts to locatable minerals. The acres of land designated as ACECs varies by alternative, with Alternative B having the most acres designated and Alternative C designating no ACECs. ACEC designation would not adversely impact the locatable minerals program because designation only results in the need for a Plan of Operations unless the ACEC specifically withdraws a portion from locatable entry.

4.2.1.3.2. Alternative A

4.2.1.3.2.1. Program Management

Alternative A identifies 23,114 acres as withdrawn (post-FLPMA) from locatable mineral entry and 2,777,334 acres of BLM-administered mineral estate as open to location. Alternative A requires Plans of Operation on just under 100,000 acres because of ACEC designation or motorized-vehicle closures. Under this alternative, existing withdrawals are renewed but no new withdrawals are planned.

4.2.1.3.2.2. Resources

Impacts to locatable minerals from management restrictions to protect soil, water, and riparian-wetland resources apply primarily to the exploratory phase. As discussed above, this would result in a very small adverse impact to mine development unless development reaches the level of undue or unnecessary degradation. Operations conducted pursuant to the 43 CFR 3809 – surface management regulations can be precluded only if unnecessary or undue degradation would result. As cited before, operating conditions applicable to leasable and salable minerals do not necessarily apply to locatable mineral operations unless they rise to the level of unnecessary or undue degradation or the operator on their own initiative includes such conditions when submitting a notice or Plan of Operations. Alternative A generally requires avoiding soil-disturbing activities in areas with LRP soils, but this would not limit locatable mineral development if necessary to extract the mineral.

Lands with wilderness characteristics are not specifically managed to preserve their wilderness characteristics, so there would be no adverse impact to locatable minerals.

The greatest adverse impact of resource management on locatable mineral activities comes from decisions to withdraw areas to protect wildlife, special status species, cultural resources, or visual resources. However, the actual adverse impact to locatable minerals would be very minor because there is little overlap between the withdrawal areas and the areas of high potential for locatable minerals (BLM 2009c). However, the Lime Kiln Gulch area in the Whiskey Mountain withdrawal for bighorn sheep reportedly contained some potential for mineral activity, and 80 acres of mineral estate in that area was not withdrawn at the time of the original withdrawal.

Heritage/cultural/historic withdrawals under Alternative A are limited to Martin's Cove.

4.2.1.3.2.3. Resource Uses

The only recreation-related withdrawals under Alternative A are those related to NHT bicentennial sites. Travel management decisions that limit closed areas to motorized vehicle travel trigger a requirement for a Plan of Operations. See the analysis under *Impacts Common to All Alternatives*.

4.2.1.3.2.4. Special Designations

Alternative A Congressionally Designated Trails do not adversely impact locatable mineral entry because no portion of the NHTs are withdrawn (except for a few sites that are common to all). Access to locatable minerals might be limited in some areas but would not be allowed to restrict development.

Except for the Whiskey Mountain and East Fork ACECs, ACEC designations under Alternative A only trigger the requirement for a Plan of Operations and do not adversely impact locatable minerals, although additional operator costs and time are required for surface-disturbing activities greater than casual use. See Table 4.15, “Acreage of Withdrawals for the Benefit of Habitat, Cultural or Recreational Values” (p. 624) for those wildlife related withdrawals.

Alternative A management of NWSRS-eligible Baldwin Creek and Sweetwater River units is determined by other special designations; the Baldwin Creek unit is part of the Lander ACEC, requiring Plans of Operations, and the Sweetwater River unit is managed as part of the Sweetwater River WSA.

4.2.1.3.3. Alternative B

4.2.1.3.3.1. Program Management

Alternative B would result in the most potential adverse impacts to locatable minerals compared to other alternatives because it withdraws the most areas from locatable mineral entry. There are 68 times more acres in the planning area withdrawn from mineral activity under Alternative B compared to Alternative A, but 278,906 of those acres are in areas of high potential. Depending on where current surface-disturbing activities intersect with withdrawals, surface disturbance as a result of locatable mineral development under Alternative B is expected to be less compared to Alternative A, although not substantially less because withdrawals are subject to valid claims. As claims within a withdrawal that are not maintained annually as per § 3830 are declared abandoned or void, withdrawals under Alternative B could result in increasingly adverse impacts to locatable minerals.

4.2.1.3.3.2. Resources

Alternative B manages the Little Red Creek Complex as non-WSA land with wilderness characteristics and closes the area to motorized vehicles, which requires a Plan of Operations for surface-disturbing activities greater than casual use. The Little Red Creek Complex in Dubois closes approximately 5,490 acres under Alternative B.

Special Designations addresses Alternative B mineral withdrawals for the benefit of wildlife because such withdrawals occur only in proposed ACECs; however, Alternative B management outside of the sage-grouse ACEC prohibits surface disturbance over a larger area than Alternative A. This protection would not preclude locatable mineral entry if necessary to obtain the mineral.

Alternative B identifies 562,713 additional acres for withdrawal due to heritage/cultural/historic protections compared to Alternative A. Additional withdrawals under this alternative are due to the expansion of the NHT withdrawals, and the proposed Beaver Rim Natural National Landmark (1,120 acres), Bison Basin Natural National Landmark (1,280 acres), and Warm Springs Canyon Flume site (834 acres). *Special Designations* addresses additional withdrawals for the protection of historic resources under Alternative B. Withdrawal of lands for mineral entry is a severe long-term adverse impact to locatable minerals; however, there is little overlap of high potential occurrence in these locations.

4.2.1.3.3.3. Resource Uses

In addition to the withdrawals for recreation common to all alternatives, Alternative B withdraws 5,594 acres in the Johnny Behind the Rocks area. This could be a substantial adverse impact to locatable minerals because of high bentonite potential in the withdrawn area. Trails and travel management decisions to support other resource values (e.g., WSAs and WSRs) can increase the cost or the processing time for surface-disturbing activities greater than casual use, but would not preclude locatable mineral activity (see Table 4.16, “Areas and Acreage Closed to Motorized Travel” (p. 624)). Alternative B expands the area closed to motorized vehicle use around WSAs to more effectively manage travel, which would increase the cost and timing of small mining disturbances; however, there is little mineral potential in these expanded areas.

Management closures to motorized travel for recreation values trigger a Plan of Operations for the Dubois Mill site (608 acres). Additional areas are closed to motorized vehicles, but are either already under a Plan of Operations requirement due to ACEC designation or are withdrawn from locatable mineral entry.

4.2.1.3.3.4. Special Designations

Special designations under Alternative B result in more adverse impacts to locatable minerals than under any other alternative. All withdrawals identified under Alternative A are maintained under Alternative B and substantial new areas are closed to pursue mineral entry withdrawal (1,632,605 acres). The largest closure is to protect the setting of the Congressionally Designated Trails, but additional areas to protect other cultural resources, such as Cedar Ridge and Castle Gardens, would also preclude mineral location. In addition, Alternative B designates 1,246,791 acres as an ACEC for the protection of greater sage-grouse and segregates (closes) the area to pursue withdrawal. A substantial portion of the sage-grouse ACEC overlaps other ACEC withdrawals; ACEC withdrawals under Alternative B total 1,492,990 acres.

There is more land withdrawn in East Fork for the protection of elk under Alternative B than under Alternative A, which would result in more adverse impacts to locatable minerals. Because there is little commercial potential in the expanded area, the actual impact of this expansion would not be likely to result in anything more than minor adverse impacts. However, expansion of the South Pass Historic Mining Area ACEC also includes a withdrawal of the entire expanded ACEC, including areas with potential for gold. While the expansion would not affect existing rights (and much of the area is claimed), the withdrawal would increase adverse impacts as claims within a withdrawal that are not maintained annually as per § 3830 are declared abandoned or void. However, actual impacts to the locatable minerals program are not clear because large-scale gold operations have not been developed in the past, even with historically high commodity prices. The more likely impact of management under Alternative B is to small operators who participate in small-scale gold mining, although those with existing claims would not be affected. Claims can be transferred, so closing the area could benefit existing claimants by making their claims the only ones available in the area.

NWSRS-eligible waterway segments managed as suitable for WSR designation under Alternative B include 31.8 lotic miles with ¼ mile on each side. Alternative B withdraws these segments; Alternative A does not; therefore, Alternative B has more adverse impacts to locatable minerals.

4.2.1.3.4. Alternative C

4.2.1.3.4.1. Program Management

Alternative C is less restrictive than alternatives A and B and has the fewest acres withdrawn from mineral entry and also the fewest special status areas where a Plan of Operations is required for explorations greater than casual use that disturb less than 5 acres.

Alternative C allows all pre-FLPMA existing withdrawals except the withdrawal for desert yellowhead to expire (post-FLPMA mineral withdrawals expire after 20 years) and does not manage any areas as ACECs. Under Alternative C, 2,800,467 acres of surface estate are open to mineral entry (or would become open over time), almost all of the total acreage available, more than any other alternative.

4.2.1.3.4.2. Resources

Alternative C includes the same restrictions on surface disturbance for the protection of soil, slope, riparian-wetland areas, and greater sage-grouse as Alternative A and substantially fewer than Alternative B. These restrictions would not preclude mining development and might impact only exploration or other activities short of actual mining. As noted above, operations conducted pursuant to the 43 CFR 3809 – surface management regulations can be precluded only if unnecessary or undue degradation would result. Operating conditions applicable to leasable and salable minerals do not necessarily apply to locatable mineral operations unless they rise to the level of unnecessary or undue degradation or the operator on their own initiative includes such when submitting a notice or Plan of Operation. Alternative C does not manage lands with wilderness characteristics; therefore, there is no travel limitation for the Little Red Creek Complex in Dubois and thus no requirement for a Plan of Operations.

Alternative C includes the fewest restrictions on locatable minerals for the benefit of wildlife of any of the alternatives. Because the locatable mineral management for wildlife is primarily in ACECs, this management is analyzed under *Special Designations* below. Alternative C includes the same protections for greater sage-grouse as Alternative A and fewer than Alternative B, but the impact of this management is primarily in time and cost of processing applications rather than constituting adverse impacts to the locatable mineral program. There could also be a cost associated with the prohibition of certain activities (e.g., surface-disturbing or disruptive) during certain times of year due to unavailability of workforce, higher maintenance costs, or inclement weather, which would be proportional to the relative amounts of surface under those stipulations.

The Alternative C protections for greater sage-grouse are the same as Alternative A and much less restrictive than Alternative B.

Protections for cultural/historic resources are the least adverse to locatable minerals under Alternative C because no new areas are withdrawn for the protection of cultural/historic resources and existing withdrawals will not be renewed if they expire over time; see Table 4.15, "Acreage of Withdrawals for the Benefit of Habitat, Cultural or Recreational Values" (p. 624) for a comparison. Because the areas that will become open to locatable minerals under Alternative C (that remain withdrawn under Alternative A) have low potential for locatable minerals, it is not likely that impacts under the two alternatives would be substantially different. Alternative C would result in substantially more beneficial impacts to locatable minerals than Alternative B, including in areas of moderate to high potential for locatable minerals, such as in the South Pass area for gold and other areas for uranium. Potential adverse impacts to locatable minerals development would be much less in the South Pass area under Alternative C than under Alternative B because the expanded withdrawals under Alternative B are expected to result in substantial impacts to locatable minerals activities beyond casual use as every dropped mining claim would be subsequently withdrawn from mineral entry, and over time, the entire area could be withdrawn.

4.2.1.3.4.3. Resource Uses

Recreation management under Alternative C would result in the same impacts to locatable minerals as Alternative A and fewer adverse impacts than Alternative B. The biggest difference is that Alternative B withdraws 3,897 acres near Johnny Behind the Rocks for recreation use and Alternative C does not. This area has high potential for bentonite. Alternative C has no Recreation Management Zones (RMZs) and no areas closed to motorized travel; therefore, there would be no additional cost or time to claimants from requiring a Plan of Operations for operations greater than casual use that would occur under Alternative B.

4.2.1.3.4.4. Special Designations

Alternative C does not designate any ACECs or manage NWSRS-eligible segments to maintain their suitability; therefore, there would be no adverse impacts to locatable minerals from these designations. WSA management as it relates to locatable minerals is uniform across the alternatives. Management of Congressionally Designated Trails under Alternative C results in the fewest adverse impacts of the alternatives because Alternative C does not manage these trails as ACECs and there is no requirement for a Plan of Operations for any operations greater than casual use in special status areas. No withdrawals are associated with the trails (except for the pre-FLPMA withdrawals that do not vary by alternative). NHPA protections would continue to be applied within ¼ mile of the NHTs, but these protections would result in few adverse impacts to locatable minerals.

Alternative C allows post-FLPMA withdrawals that are part of ACEC management to expire, which would be substantially less adverse to locatable minerals than Alternative B and somewhat less adverse than Alternative A. As identified in the *Cultural Resources* section, this difference would be particularly important in areas with high potential for uranium, the South Pass area, and in areas in the Government Draw/Upper Sweetwater Sage-Grouse ACEC designated under Alternative B.

4.2.1.3.5. Alternative D

4.2.1.3.5.1. Program Management

Alternative D identifies 42,855 acres as withdrawn (post-FLPMA) from locatable mineral entry and 2,757,625 acres of BLM-administered mineral estate as open to location. Alternative D requires Plans of Operation on approximately 275,000 acres because of ACEC designation or motorized-vehicle closures. Under this alternative, existing withdrawals are renewed and three new withdrawals are identified: Johnny Behind the Rocks for recreation, Cedar Ridge for cultural-Native American concerns, and additional lands in East Fork for wildlife.

4.2.1.3.5.2. Resources

Under Alternative D, management to protect soils would result in similar adverse impacts as alternatives A and C, with slightly more adverse impacts to soils with slopes between 15 and 24 percent, where conditions over and above standard stipulations could be applied. These restrictions could require more mitigation or relocation of facilities but would not preclude locatable mineral development. Impacts to locatable minerals from management restrictions to protect soil, water, and riparian-wetland resources would apply primarily to the exploratory phase. This would result in few adverse impacts to mine development, unless development reached the level of undue or unnecessary degradation. As noted above, operations conducted pursuant to the 43 CFR 3809 – surface management regulations can be precluded only if unnecessary or undue degradation would result. Although lands in the Little Red Creek Complex are managed as non-WSA lands with wilderness characteristics under Alternative D, the lands are not withdrawn and there would be no adverse impacts to locatable minerals.

The most adverse impact to locatable mineral activities from resource management would result from decisions to withdraw areas to protect wildlife, special status species, cultural resources, or visual resources. However, the actual adverse impact to locatable minerals would be minor because there is little overlap with the withdrawal areas with known mineral occurrences.

Alternative D would result in the same adverse impacts to locatable minerals from protections of potential sole-source aquifers and groundwater recharge areas as Alternative B because surface occupancy is not allowed. Although Alternative D includes the same management to protect water quality as Alternative A (closing floodplains and riparian-wetland areas to surface occupancy), at most this would limit exploration and not development if necessary to obtain the mineral.

In addition to the adverse impacts to locatable minerals for the protection of wildlife common to all alternatives, Alternative D, like Alternative A, avoids roads in big game crucial winter range and parturition areas. This would result in a less adverse impacts than Alternative B's more restrictive approach to road building, but moderately more adverse than Alternative C. Under no alternative would road building required for locatable minerals preclude mining activity, but roads would be limited to the minimum necessary.

Alternative D includes the fewest restrictions on the use of chemical vegetation treatment in sensitive plant populations. However, this would not result in a beneficial impact to locatable minerals; surface mining in desert yellowhead critical habitat is not allowed under any alternative because the mapped locations are withdrawn.

Management for protection of greater sage-grouse under Alternative D results in a less adverse impact to locatable mineral exploration than Alternative B, but substantially more than alternatives A and C. Like Alternative B, Alternative D closes areas within 0.6 mile of greater sage-grouse leks to surface disturbance but locatable mineral development is not subject to this limitation by the BLM. (See *Cumulative Impacts to Greater Sage-Grouse from Management Actions* in the *Cumulative Impacts* section for constraints on locatable mineral activities that are imposed by the State of Wyoming.) Alternatives A and C close 16,283 acres. Alternative D also places fewer restrictions on the height of objects in the Core Area than Alternative B. Alternative D allows locatable mineral development within 0.6 mile of leks in the Core Area, 93,410 acres more than Alternative B.

Management of reptile habitat under Alternative D would result in slightly more adverse impacts to locatable minerals than Alternative A or C and substantially fewer than Alternative B. Locatable mineral potential has not been mapped for reptile habitat.

Alternative D management for riparian-wetland protection has the same adverse impacts to locatable mineral exploration as alternatives A and C. This would be much less adverse than Alternative B, which closes 125,403 more acres. Alternative C riparian-wetland management results in the least potential adverse impacts to locatable minerals, but no alternative precludes mining activity required to extract the mineral resource, as opposed to exploration.

Adverse impacts to locatable minerals under Alternative D are far less than under Alternative B and slightly more than under Alternative A because Alternative D withdraws 19,709 more acres than Alternative A. There are more adverse impacts under Alternative D than under Alternative C, because withdrawals with expiration dates are not renewed under Alternative C and would eventually become available at expiration. It is not possible to quantify the relative impact of the different management actions because the withdrawn lands have unknown or limited mineral potential.

Management of Traditional Cultural Properties (TCPs) generally does not adversely impact locatable mineral development. In the Warm Springs Flume Site, as for alternatives A, B, and C, management to protect cultural resources in the flume site under Alternative D results in no adverse impacts to locatable minerals (other than the existing 178 acres withdrawn). Alternative B results in the most adverse impacts because it withdraws 1,632,605 acres; however, this area is considered low potential for locatable minerals.

VRM could adversely impact locatable mineral development that does not meet VRM requirements on a site-specific basis. Alternative D manages 7,322 acres with uranium potential as VRM Class I and Class II, which would make development more difficult because of additional stipulations to manage visual intrusions. This would be similar to the impact under Alternative B and slightly more adverse than the impact under Alternative A. Alternatives A, B, and D result in substantially more adverse impacts than Alternative C, which manages 3,630 acres with uranium potential as VRM Class IV.

4.2.1.3.5.3. Resource Uses

Although Alternative D (and Alternative B) closes more recreation and interpretive sites than alternatives A and C, these sites are not identified as having either gold or uranium potential;

therefore, additional adverse impacts to these resources would not be expected. Under Alternative D, the Johnny Behind the Rock area is withdrawn from mineral entry. This would result in more potential adverse impacts because of bentonite occurrence in the area. However, the degree of the adverse impact depends on which existing claims continue to be held; where claims within a withdrawal that are not maintained annually as per § 3830 are declared abandoned or void, potential impacts would likely increase. Whether the bentonite resource in this area is of sufficient quality for commercial development is largely unknown; therefore, the economic impact cannot be analyzed.

4.2.1.3.5.4. Special Designations

Alternative D Congressionally Designated Trails management does not adversely impact locatable minerals except to the extent that VRM may adversely impact certain exploratory activity by restricting disturbances. The portion of the Trails management area that has moderate to high potential for locatable minerals is designated a Trails' ACEC which requires a Plan of Operations for disturbances smaller than five acres. There are no mineral withdrawals related to Trails management so Alternative D is more beneficial to locatable minerals than Alternative B and somewhat more adverse than alternatives A and C which are less protective of the Trails' setting. Certain VRM stipulations could be developed, but VRM would not preclude mineral extraction itself.

Alternative D management of ACECs and the areas proposed as ACECs under other alternatives would result in fewer adverse impacts to locatable minerals than management under Alternative B, but more than under Alternative A and substantially more than under Alternative C. Alternative D withdraws 42,855 acres of locatable minerals, but none of these areas have uranium potential. The mineral withdrawal in the aforementioned area of identified bentonite resources is for recreation and visual resource values. Gold resources would be less impacted under Alternative D compared to Alternative B primarily due to the lack of additional withdrawn acreage in the South Pass area. Impacts to the gold resource under Alternative D would be approximately the same as in Alternative A, and greater than in Alternative C.

Alternative D manages the NWSRS-eligible Baldwin Creek and Sweetwater River segments as suitable for inclusion in the NWSRS; however, this management would not result in additional adverse impacts to the locatable minerals program because these segments are not withdrawn from locatable mineral entry.

4.2.2. Leasable Minerals – Coal

The BLM does not anticipate any reasonable foreseeable coal exploration, leasing, or development during the planning cycle. If the BLM receives an application for a federal coal lease, it will require an appropriate land use and environmental analysis, including a coal screening process, to determine whether the area(s) proposed for leasing are acceptable for further leasing consideration, as defined in 43 CFR 3420.1-8, after application of the unsuitability criteria, multiple use conflict, and surface owner consultation coal screens in 43 CFR 3420.1-4. If the BLM determines that public lands are acceptable for further consideration for coal leasing, it will amend the land use plan as necessary. The BLM accepts federal coal lease applications only for federal coal lands with development potential identified as suitable for further leasing consideration after application of the coal screens and unsuitability criteria. Therefore, impacts to coal resources from the management of other resources are not analyzed.

4.2.3. Leasable Minerals – Geothermal

Lands in the planning area have been classified as having low, very low, and negligible potential for geothermal development. Because of current policy direction guiding the development of renewable energy resources on public lands, there could be increased interest in geothermal exploration and development in the planning area over the next 10 to 20 years, particularly as co-located with deep oil and gas wells. Additional information and related studies on geothermal resources and development potential in the planning area can be found in the RFD Scenario for Geothermal Development, Lander Field Office Planning Area (BLM 2009e).

The impacts described in the *Leasable Minerals – Oil and Gas* section are the same as for geothermal exploration and development. In addition, adverse impacts to geothermal resources result from management of other resources that specifically limit or prohibit the use of geothermal resources. Beneficial impacts result from management that maintains or increases public use and access to geothermal resources.

Management of geothermal leasing on split-estate lands (federal mineral ownership and private surface ownership) will not limit or prohibit the use of warm-water or normal-temperature geothermal systems for non-utility-grade home heating or other applications.

4.2.3.1. Summary of Impacts

The primary impacts to geothermal exploration and development result from managing areas as closed, or open with moderate or major constraints. The area closed to leasable oil and gas exploration and development, and therefore leasable geothermal exploration and development, is largest under Alternative B, followed by alternatives D, A, and C. Therefore, adverse impacts to geothermal exploration and development would be the greatest under Alternative B, as identified in the *Leasable Minerals – Oil and Gas* section.

4.2.3.2. Methods and Assumptions

The analysis in this section is based on the following assumptions:

- BLM-administered land in the planning area that is open to oil and gas leasing is open to geothermal leasing, subject to appropriate mitigation developed through use of the mitigation guidelines described in the *Leasable Minerals – Oil and Gas* section.
- Unless otherwise noted, lands identified as closed for oil and gas leasing are closed for geothermal leasing.
- There is minimal interest in development of geothermal resources during the planning period (BLM 2009e) and no well count and surface disturbance projections by alternative have been analyzed.
- No geothermal development has been identified in the RFD Scenario for Geothermal Resources as having more than negligible probability. In that context, the most likely type of geothermal use is from cogeneration as a by-product of oil and gas operations. Therefore, geothermal use would be considered a beneficial use of the oil and gas lease and would not require a geothermal lease. Any such use would be site specific and is not further analyzed in this document.

4.2.3.3. Detailed Analysis of Alternatives

4.2.3.3.1. Impacts Common to All Alternatives

Management and restrictions for geothermal resources are the same as those for oil and gas resources. Areas open to oil and gas leasing are open to geothermal leasing, and areas closed to oil and gas leasing are closed to geothermal leasing. The units of the National Lands Conservation System (NLCS), including WSAs, Congressionally Designated Trails, and WSRs, were closed by the 2008 Programmatic Geothermal ROD, which otherwise opened the planning area to geothermal leasing.

Accordingly, although potentially open to oil and gas leasing, these areas are closed to geothermal exploration and development under all alternatives. Exploration and development of geothermal resources are also subject to the same restrictions on surface-disturbing activities applied to oil and gas exploration and development. Therefore, impacts to geothermal exploration and development under each alternative are the same as those described in the *Leasable Minerals – Oil and Gas* section or, in the case of NLCS units, slightly more restrictive. Because commercial geothermal development requires drilling and facilities comparable to those associated with oil and gas development, management that affects oil and gas are expected to similarly affect geothermal development.

Because of the anticipated none to low level of geothermal development (BLM 2009e), as described in the RFD Scenario for Geothermal Resources, compared to oil and gas development the impacts to geothermal resources from management actions could be less severe. However, with the potential for geothermal resources being none to very low, the degree of impacts between alternatives, based on management actions under the alternatives, are the same since development potential is low under all alternatives.

Impacts to geothermal resources common to all alternatives are similar to impacts described in the *Leasable Minerals – Oil and Gas* section. Under all alternatives, any potential geothermal development applications on federal mineral estate in the planning area are carefully assessed to avoid adverse impacts to other resources. Because all alternatives apply NLCS restrictions and result in the same types of adverse impacts to geothermal development, these lands are not analyzed by alternative.

4.2.3.3.2. Alternative A

Alternative A is the baseline for determining impacts under the other alternatives. Because most of the planning area is open to oil and gas leasing under Alternative A, most is open to geothermal leasing and development or open with moderate constraints.

Table 4.17, “Acres of Mineral Estate Open, Open with Constraints, and Closed to Geothermal Leasing” (p. 635) identifies the acres of mineral estate open, open with constraints, and closed to geothermal leasing under each alternative, including Alternative A.

Table 4.17. Acres of Mineral Estate Open, Open with Constraints, and Closed to Geothermal Leasing

Management	Alternative A	Alternative B	Alternative C	Alternative D
Open	728,277	6,287	797,174	46,038
Open with moderate constraints	1,703,913	322,717	1,738,283	1,536,525
Open with major constraints	242,266	175,369	165,747	1,011,538
Closed	134,686	2,304,728	107,897	215,000
Source: BLM 2009a				

4.2.3.3.3. Alternative B

Alternative B closes substantially more areas to oil and gas development, and therefore geothermal development, than Alternative A, including all of the Dubois area and greater sage-grouse Core Area. In general, Alternative B includes many more restraints on oil and gas development than Alternative A. However, the economic impacts to geothermal development associated with the more restrictive approach under Alternative B cannot be quantified.

4.2.3.3.4. Alternative C

Alternative C includes the fewest restraints on oil and gas development. Therefore, it would result in the fewest restrictions on geothermal exploration and development.

4.2.3.3.5. Alternative D

Alternative D includes fewer restrictions on oil and gas development than Alternative B, but more than Alternative A, and substantially more than Alternative C. These restrictions apply to geothermal leasing and development.

4.2.4. Leasable Minerals – Oil and Gas

The potential for oil and gas occurrence in the planning area ranges from high to very low, as identified in the RFD Scenario for Oil and Gas (BLM 2009d). Lands in the planning area are classified as having potential for development of oil and gas resources. Projected drilling in existing oil and gas development areas accounts for a large proportion of the well numbers, with a smaller share attributed to additional new discoveries in both conventional and unconventional reservoirs. The RFD Scenario for Oil and Gas considers the potential for development of CBNG to be moderate, low, very low, or nonexistent.

Adverse impacts to oil and gas exploration and development would result from management actions that restrict or constrain the potential for oil and gas leasing, development, and exploration. Constraints to oil and gas development include no surface occupancy (NSO) stipulations, CSU restrictions, timing limitation stipulations (TLS), and allocation of public land for management of other resource objectives that limit or prohibit oil and gas exploration and development. These restrictions could include provisions imposed prior to leasing under a Master Leasing Plan (MLP). Additional adverse impacts to oil and gas exploration and development could result from specific management actions that require mitigation, certain BMPs, or other lease stipulations to protect resources that could increase project costs and timeframes. Beneficial impacts to oil and gas exploration and development result from management actions that increase the potential for leasing, exploration, and development by limiting restrictions or opening areas for oil and gas exploration and development.

Management actions to protect other resource values would adversely impact new oil and gas leases, exploration, and development. An impact is an action that specifically prohibits or permits oil and gas leasing, exploration, or development. Adverse impacts include the management of areas as closed for new oil and gas leasing. Other impacts result from management actions that place or remove surface use restrictions or impose additional requirements on oil and gas exploration and development (such as BMPs or impact mitigation measures). These actions do not explicitly permit or prohibit oil and gas exploration and development, but could influence an operator's decision whether to proceed.

The Leasing Reform Act of 2010 identified MLPs as a management tool for site-specific protection of resources that could be adversely impacted by oil and gas development. To the extent that the additional resource protections in the MLP are limits on development, they would be considered adverse to the oil and gas program. However, they are less adverse than closing an area to oil and gas or leasing it subject to an NSO stipulation. The alternatives vary in their use of MLPs.

4.2.4.1. Summary of Impacts

Under all alternatives, limitations and restrictions on surface-disturbing activities for oil and gas exploration and development also apply to geophysical exploration and development. Impacts to oil and gas development and geophysical operations under alternatives A and C are similar in type, although they vary in extent because of the different areas managed as closed to oil and gas leasing and different surface-use restrictions under these alternatives.

The most substantial difference between alternatives A and C are adverse impacts to oil and gas development that are part of the special designations (primarily ACECs) under Alternative A but not under Alternative C. Alternative C has no areas with NSO restrictions except for a ¼-mile buffer around greater sage-grouse leks and certain limitations imposed by the cultural resources program. Adverse impacts to oil and gas exploration and development would be the greatest under Alternative B, which closes greater sage-grouse Core Area to oil and gas leasing.

All of the alternatives include management that would restrict oil and gas leasing and development to varying levels compared to the projected unconstrained baseline scenario. In this sense, all of the alternatives would result in adverse impacts to oil and gas development because of the application of law and policy to this activity on BLM-administered lands. Primary impacts to oil and gas development would result from managing areas as closed or prescribing surface-use restrictions such as NSOs, CSUs, and TLS, which create moderate or major constraints to oil and gas development. The level of impacts varies among alternatives based primarily on the types of restrictions and the acreage of restrictions by alternative.

Areas closed for oil and gas development are fewest under Alternative C and most under Alternative B. Alternative C includes the largest amount of area open to oil and gas development subject to the standard lease form only, followed by Alternative A, Alternative D, and then Alternative B. Alternative A includes the most areas open to oil and gas development with moderate and major constraints, followed by Alternative C, Alternative D, and then Alternative B (because of the large portion of the planning area closed under Alternative B). Therefore, Alternative B would result in the most adverse impacts to oil and gas development and Alternative C the least. Under all alternatives, existing (Alternative A) management stipulations are applied in areas the RFD identifies as having high and moderate potential for oil and gas, except for areas in greater sage-grouse Core Area.

As described in Chapter 3, the Beaver Rim area was identified by the BLM as appropriate for analysis as an MLP. The Beaver Rim area is analyzed under Alternative D for MLP management (Alternative B manages this area as an ACEC and closes it to oil and gas leasing). Alternative D utilizes the MLP approach to apply more restrictive oil and gas management than standard stipulations but not as adverse as the impacts from closing the Beaver Rim area to oil and gas leasing as under Alternative B.

4.2.4.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" on the leased lands, subject to the terms and conditions incorporated in the lease (BLM Form 3100-11, Lease for Oil and Gas). Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms.
- The Authorized Officer requires reasonable measures to minimize adverse impacts to other resource values, land uses, or users not addressed in the lease stipulations at the time operations are proposed. Reasonable measures could include changes in siting or in facilities design, timing of operations, and specification of interim and final reclamation measures. These modifications will occur only through site-specific post-lease actions (e.g., Application for Permit to Drill [APD] and ROWs) supported by onsite conditions and/or project-specific NEPA analyses. Modifications of and waivers to lease terms and stipulations can be accomplished in accordance with applicable regulatory guidelines. Surface-disturbing and other disruptive activities will occur at existing authorized facilities.
- NSO restrictions identified in this RMP can be applied only to new oil and gas leases. Stipulations in existing leases will continue as they are without regard to management actions in the RMP. New constraints and requirements identified in the approved RMP could be applied to subsequent exploration and development activities on existing leases through the use of Conditions of Approval (COAs), provided they are within the authority reserved by the terms and conditions of the lease.
- This analysis considers the baseline total unconstrained oil and gas development potential taken from the RFD Scenario for Oil and Gas (BLM 2009d), as summarized in Chapter 3, and applies the alternative constraints from the other programs as described in Chapter 2. As old leases expire and new ones are issued, new leases are subject to relevant stipulations in the RMP unless an exemption applies. However, in accordance with 43 CFR 3101.1–2, site-specific COAs can be applied to APDs to avoid adverse impacts to resource values by development on existing leases.
- The number of wells the RFD projected for oil and gas does not limit or cap the number of wells that can be drilled in the planning area, or the amount of surface disturbance associated with oil and gas development. This clarification reaffirms that the RFD is intended for analysis purposes only, to compare the management prescriptions of each alternative. Individual implementation-level project proposals are subject to site-specific NEPA analysis to ensure conformance with the RMP and to evaluate impacts to other resources. The RFD Scenario for Oil and Gas based development potential on the anticipated drilling activity over the next 20 years and has most of the development occurring as infill wells in existing fields and development areas.

- Oil and gas development potential is based on the following Wyoming State Office Reservoir Management Group categories for both conventional gas and CBNG (Maps 17 and 20):
    - High potential for hydrocarbon development indicates areas where the average well density is anticipated to be more than 100 wells per township.
    - Moderate potential for hydrocarbon development indicates areas where the average well density is anticipated to be between 20 and 100 wells per township.
    - Low potential for hydrocarbon development indicates areas where the average well density is anticipated to be 2 to fewer than 20 wells per township.
    - Very low potential for hydrocarbon development indicates areas where the average well density is anticipated to be fewer than two wells per township.
    - No potential for hydrocarbon developments indicates areas where no wells are anticipated.
- Moderate and major constraints identified for each alternative (see Chapter 2) were applied to the unconstrained RFD Scenario for Oil and Gas development to develop Maps 29 through 32 and the RFD Scenario for Oil and Gas development for each alternative. Non-federal well numbers and related disturbance acreage are assumed to be the same under all alternatives. These are within the range of limitations between closed to leasing and standard stipulations. Some constraints were applied
- Areas are described as either open or closed to oil and gas leasing. Areas open to oil and gas leasing are subject to the limitations of the standard lease; subject to moderate constraints such as seasonal and CSU-use restrictions; or subject to major constraints such as NSO on an area of more than 40 acres or more than ¼-mile wide. The major constraints category also includes areas where overlapping moderate constraints would substantially limit development. For purposes of this analysis, it is assumed that seasonal constraints exceeding 6 months are major constraints; Major constraints are assumed to result in more adverse impacts to oil and gas leasing, exploration, and development than moderate constraint and areas open with standard stipulations.
- Surface-use restrictions, including TLS, NSOs, and CSUs, and those contained in MLPs, and designations of unavailable for leasing, cannot be retroactively applied to valid, existing oil and gas leases or to valid, existing use authorizations (e.g., APD). However, post-lease actions/authorizations (e.g., APDs and road/pipeline ROWs) could be encumbered by TLS and CSUs case by case, as required through project-specific NEPA analyses or other environmental review. If leases were to expire, the new constraints would be applied if the parcels were offered for lease again; there is no “lease renewal” which would grandfather in the older management.
- Surface disturbance projections for leasable oil and gas development assume one well per well pad and a support road and pipeline. Projected acres of short-term surface disturbance is 12.5 acres for each non-coalbed exploratory well, 6 acres for each non-coalbed development well, 5.5 acres for each coalbed well, and 16 acres for each deep well. Projected acres of long-term surface disturbance is 9 acres for each non-coalbed exploratory well, 4 acres for each non-coalbed development well, 3.5 acres for each coalbed well, and 11 acres for each deep well. Some wells could be developed with fewer acres of disturbance than these projections, while other wells could result in substantially more disturbance. Multi-well pads are not precluded in the planning area, but are encouraged where possible. Multi-well pads result in less long-term disturbance per well.
- In areas of LRP, timeframes for successful interim and final reclamation of oil and gas well pads, flow lines, and access roads are affected.
- Other than the depletion of hydrocarbon reserves through authorized fluid mineral leasing, development, and production operations, the resource management actions developed through this plan would not physically impact the subsurface oil and gas resources in the planning area.

- Directional drilling can be used to access hydrocarbon resources under areas constrained by surface-use restrictions (e.g., slope restrictions, riparian-wetland area setback, NSOs, and buffers within a CSU zone around greater sage-grouse leks) that necessitate relocating wells. Directional drilling viability and offset distance varies with the target formation, the depth of the target formation, and down-hole equipment necessary for production. Generally, directional drilling can be addressed only on a site-specific basis. However, directional drilling is an approach to limit surface disturbance and reclamation challenges. The alternatives vary in the extent to which oil and gas operations are required to limit surface disturbance.
- Leasable mineral resources are considered unrecoverable in areas designated unavailable for leasing. Mineral resources are also considered unrecoverable in areas open to leasing but where surface-use constraints prohibit development operations on areas larger than can be technically and economically developed from offsite locations. Leasable mineral resources in leased in-holdings are considered recoverable.
- Provisions in lease agreements expressly provide Secretarial authority to deny or restrict development in whole or in part depending on an opinion from the USFWS regarding impacts to endangered or threatened species or habitats of plants and animals listed or proposed for listing. If the USFWS concludes that the development likely would jeopardize the continued existence of any endangered or threatened plant or animal species, then the development could be denied in whole or in part. The USFWS has determined that listing of the greater sage-grouse under the ESA is warranted but precluded. The BLM manages greater sage-grouse as a special status species.

4.2.4.3. Detailed Analysis of Alternatives

4.2.4.3.1. Impacts Common to All Alternatives

Under all alternatives, management that results in areas being open, open with constraints, or closed (also called "administratively unavailable" to leasing) would impact oil and gas development by allowing, limiting, or prohibiting exploration and development in certain areas. Impacts are similar across alternatives because the definitions of areas open subject to the standard lease form, open with moderate constraints, open with major constraints, and closed are the same under all alternatives. The severity of these impacts varies by alternative based on the amount of acreage and the associated oil and gas development potential. Protective measures for other resources, including limiting or prohibiting access and development in areas where there are specific resources, or controlling the timing or nature of development that can occur, would result in adverse impacts. Restrictions on oil and gas development under each of the alternatives would also result in adverse impacts to the rate of oil and gas exploration, development, and extraction. These impacts would increase the cost, to both the producer and the user of the end products, of exploring for, developing, and extracting oil and gas. Under all alternatives, BMPs must be implemented in the exploration, development, production, and abandonment of oil and gas resources.

In areas closed to oil and gas leasing, valid existing lease rights are honored; however, if the lease expires or is cancelled, the lease acreage will not be re-offered. In these cases, if drainage of federal oil and gas is determined to be occurring, leasing could be authorized on a case-by-case basis with NSO restrictions.

In areas of high and moderate potential for oil and gas as identified in the RFD, existing (Alternative A) management stipulations are applied under all alternatives except for areas within the boundaries of greater sage-grouse Core Area under Alternative B. This management allows continued development in existing oil and gas development areas.

Under all alternatives, areas closed to oil and gas leasing will also be closed to geophysical exploration, and areas that are open to oil and gas leasing are open to geophysical exploration. Therefore, managing areas as closed would result in adverse impacts to exploration and development of fluid mineral resources by prohibiting both oil and gas exploration and subsequent development and extraction. Alternatively, allowing geophysical exploration in areas open to oil and gas development would result in beneficial impacts to oil and gas exploration and development. Requiring geophysical exploration to be performed within the constraints (such as NSOs or CSUs) necessary to protect other resources would result in adverse impacts to oil and gas exploration.

Adverse impacts to exploration, such as increased costs to the operator from the use of more expensive but less surface-disturbing techniques (such as small, portable, foot- or helicopter-transported surveying equipment in areas with surface-use restrictions) are impacts to operators but extremely difficult to quantify on a planning area basis. These additional costs to the operator are not analyzed here or compared among alternatives unless the costs are so great as to preclude development. However, if surface-use restrictions prevent an operator from effectively surveying and exploring oil and gas resources and development locations are sited based on incomplete information, this would affect the operator’s ability to develop the leases. These limitations would result in both increased expense to the operator (not an adverse impact to the oil and gas program) and also in nonproductive disturbances to land and surface resources.

In areas where federal oil and gas leases are or have been issued without stipulations, subsequently placing additional mitigation measures on exploration and development could result in adverse impacts to ongoing or future oil and gas development. Requiring additional stipulations on new leases could constrain exploration, development, production, or other actions that increase the timeframe and cost of operations. Mitigating measures attached to an APD as COA influence how an activity is accomplished, but rarely preclude the activity from occurring. Such management actions in complex areas involving impact avoidance to several resources could limit oil and gas operations.

Special designations (ACECs, NHTs, WSRs) and other special management areas such as those for recreation could result in adverse impacts to oil and gas exploration and development, depending on their locations in relation to oil and gas potential and the oil and gas management prescriptions applied, such as NSO. Special designations do not necessarily apply management prescriptions on oil and gas developments. For example, the 1987 RMP designated nine ACECs; of these, three had no oil and gas management restrictions and, therefore, no adverse impacts to oil and gas development. Adverse impacts to oil and gas development as a result of special designations are analyzed under each alternative.

All alternatives manage WSAs in accordance with the Interim Management Policy (IMP). Management does not vary by alternative and is not further analyzed except to the extent relevant for an individual alternative, such as management of lands adjoining a WSA to support wilderness values.

The number of acres closed to oil and gas leasing vary by alternative. For example, Alternative B closes the entire greater sage-grouse Core Area to oil and gas leasing. The more acres closed to oil and gas leasing, the more adverse impacts to the oil and gas program. Table 4.18, “Total Acres of Federal Mineral Estate Open, Open with Constraints, and Closed to Oil and Gas Leasing by Alternative" (p. 641) lists the number of acres closed to oil and gas leasing under each alternative. The economic impacts from closing areas to oil and gas leasing are analyzed in the *Socioeconomic Resources* section.

Table 4.18. Total Acres of Federal Mineral Estate Open, Open with Constraints, and Closed to Oil and Gas Leasing by Alternative

Restriction	Alternative A	Alternative B	Alternative C	Alternative D
Open with standard conditions	731,144	32,952	804,794	46,039
Percent of federal mineral estate	26	1	29	2
Open with moderate restrictions	1,715,341	309,100	1,755,628	1,470,338
Percent of federal mineral estate	61	11	62	52
Open with major restrictions	337,481	187,524	248,601	1,182,711
Percent of federal mineral estate	12	6	9	42
Closed for leasing	25,136	2,279,525	78	110,014
Percent of federal mineral estate	1	82	Less than 1	4
Source: BLM 2009a				

Management actions that require the use of special mitigation, such as protections for cultural resources, would impact all alternatives on a project-specific basis depending on the overall constraints under each alternative. Standard mitigation measures and BMPs are design features required under all alternatives and are not analyzed further in this document. In general, constraints (such as NSOs, CSUs, and TLS) on exploration, development, production, and abandonment of oil and gas resources are real costs to the proponent but not environmental impacts to be analyzed here unless they preclude development. Such constraints could result in beneficial impacts by consolidating surface-disturbing activities, thereby reducing the cost of construction in a given area. These impacts are quantifiable only on a site-specific basis, if at all.

Major constraints to oil and gas exploration and development, such as NSOs or overlapping TLS, result in adverse impacts to oil and gas exploration and development by limiting or prohibiting development in these areas or requiring certain drilling techniques, BMPs, or other mitigation. The RFD Scenario for Oil and Gas development considers constraints in determining the likelihood of overall production. The economic implications to the oil and gas program are analyzed in the *Socioeconomic Resources* section. Alternatives are compared using the number of acres of potential under various management prescriptions.

Companies typically cannot use directional drilling to develop CBNG because the reservoirs are relatively shallow and costs are greater because of the maintenance of the down-hole pumping equipment. An operator could decide to not develop oil and gas resources in an area with major constraints because of the increased cost associated with restrictions compared to the economic risk factor. The RFD considers these factors.

The number of acres open to leasing with an NSO stipulation vary by alternative. The more acres with an NSO stipulation, the more adverse impacts to the oil and gas program. Table 4.18, "Total Acres of Federal Mineral Estate Open, Open with Constraints, and Closed to Oil and Gas Leasing by Alternative" (p. 641) lists the acres with major leasing constraints, including an NSO stipulation, under each alternative. The *Socioeconomic Resources* section identifies and analyzes the economic impacts associated with each category.

On split-estate lands (areas with private surface ownership and federal mineral estate), determination of access road and well pad locations in conjunction with the surface owner and other considerations could result in additional costs to the operator. This analysis does not address that impact to operators which varies in accordance with site-specific issues.

When necessary to protect important habitats, the BLM would attach COAs for operations proposed on existing oil and gas leases in areas designated as unavailable for leasing, which would exclude surface occupancy and surface disturbance. This is done to the maximum extent possible without violating lease rights. Such restrictions on occupancy and surface disturbance could limit the operator's ability to extract the federal oil and gas resources under lease. For example, directional drilling from an area outside such a lease to a bottom-hole location in a leased area targeted by the operator might not be technically or economically feasible.

Under all alternatives, management to suppress INNS is required. Although INNS requirements will increase the cost to the operator, this is not an adverse environmental impact and will not preclude oil and gas development. Because INNS management is the same across all alternatives, it is not further analyzed.

Under all alternatives, special status species inventories could be required for surface-disturbing projects in known or suspected special status species habitat. Postponing or modifying projects that could affect special status species would lead to a delay in the development and/or the relocation of wells, access roads, pipelines, or ancillary facilities. These impacts do not vary by alternative.

Oil and gas leasing processes were established through the Mineral Leasing Act of 1920, as amended. This act promotes the mining of coal, phosphates, oil, oil shale, gas, and sodium on the public lands, to the fullest extent possible. The act also makes leasing discretionary. The objective is to promote the orderly and efficient exploration, development, and production of oil and gas. Oil and gas management around intensively developed existing fields would result in beneficial impacts to oil and gas exploration and development by allowing for full development and ultimate recovery of known oil and gas resources. Each alternative varies in the management of developed fields and the protections afforded to resources.

Typical impacts from cultural resource management actions on oil and gas exploration and development would include increased well development costs associated with cultural resource inventories, relocation of projects (well pads, roads, and pipelines) to avoid a cultural site, implementation of offsite drilling (directional drilling) techniques, and/or site excavation if avoidance is not possible. Discovery of previously undocumented cultural features during project construction would delay project implementation while the site is evaluated, but would not be likely to prevent development of a lease.

Moderate constraints to oil and gas exploration and development result in adverse impacts by limiting the time of construction and operation activities or requiring specific mitigation or lease stipulations. Moderate constraints do not remove the area from oil and gas exploration and development or require directional drilling. Under TLS, development could become more intensive over a shorter timeframe to complete operations before timing restrictions apply. In areas with overlapping TLS, companies could be limited to narrow timeframes to complete work. Overlapping CSUs that restrict oil and gas operations to less than 6 months in a 12-month period are analyzed here as a "major" constraint. NSOs are the more typical "major constraint."

The more acres with moderate constraints rather than standard stipulations, the more adverse impacts to the oil and gas program. Table 4.18, “Total Acres of Federal Mineral Estate Open, Open with Constraints, and Closed to Oil and Gas Leasing by Alternative” (p. 641) lists the acres of federal mineral estate subject to moderate constraints. The *Socioeconomic Resources* section analyzes the financial implications of moderate constraints under each alternative.

Under all alternatives, management actions for ROWs would impact oil and gas development by allowing, limiting, or prohibiting facilities and infrastructure necessary for the development and extraction of oil and gas resources, including access roads, powerlines, and pipelines. Federal regulations require ROW grants for access roads, powerlines, or pipelines outside the boundaries of a lease or agreement. Avoiding or excluding these authorizations would limit or prohibit legal access and infrastructure to well pads. Management that limits or prohibits ROW authorizations (ROW avoidance and exclusion areas) would result in adverse impacts to oil and gas development.

Oil and gas exploration and development often occur in grazing allotments. Oil and gas operators would be required to abide by mitigation measures specified in lease stipulations or in the COAs for those operations. Mitigation measures required to minimize adverse impacts to livestock grazing would increase the cost of oil and gas exploration and development. These measures would include providing for the upkeep and repair of fences and gates and implementing measures to prevent loss of or injury to livestock. Livestock mitigation would not be expected to substantially affect the technical or economic viability of oil and gas development and are not analyzed in this document.

Under all alternatives, pre-FLPMA lands withdrawn for recreation and cultural purposes are managed as NSO. These designated recreation sites are small and could be developed through directional drilling techniques; therefore, the impact to the oil and gas program would be small. These recreation sites are in areas where there is very low or no oil and gas potential, and therefore would result in negligible impacts to overall development in the planning area. These impacts would not vary by alternative and are not further analyzed.

Reclaiming areas of surface disturbance with a desired plant community to prevent erosion, monitor and treat invasive plant species that occupy areas disturbed by oil and gas development and production, and returning vegetation and habitat to predetermined conditions is required under all alternatives. Interim reclamation composition varies by alternative and by area and has impacts on how quickly an area may return to usable habitat.

Under all alternatives, the extent of impacts to oil and gas development from constraints and limitations on exploration and development are directly related to the potential for oil and gas in an area. Management actions that constrain development of oil and gas in high potential areas would generally result in more adverse impacts to development than similar management actions that constrain development in low potential areas. The RFD describes the potential for oil and gas occurrence and development potential in the planning area.

Any conflicts of overlapping resource uses, such as locatable mineral entry, ROWs, and mineral leasing, including oil and gas resources, are legally resolved through first and preexisting rights and precedence from earlier court decisions.

Any areas closed to oil and gas leasing could be reviewed for potential leasing if drainage is determined to be occurring (i.e., if a well on state or patented lands drains the oil and gas resources from federal mineral estate resulting in a loss to the federal government).

In areas open to oil and gas leasing, all leases are subject to standard lease stipulations; some additional stipulations could be applied at the time of leasing. All geophysical exploration is subject to identified COAs, and if geophysical operations can be performed within identified constraints to protect other resources, the operations are allowed. Constraints to geophysical exploration are the same as for oil and gas development.

Many impacts from resource management restrictions result in increased cost of operations for oil and gas development. As for other resources and uses, additional costs and expenses that to the proponent (the oil and gas developer) are not considered impacts to the oil and gas program unless development is precluded. Any economic impacts to the oil and gas program (wells drilled and produced or not) identified under the range of alternatives are addressed in the *Socioeconomic Resources* section.

4.2.4.3.2. Alternative A

4.2.4.3.2.1. Program Management

Oil and gas management under Alternative A requires that oil and gas exploration and development consider all other surface uses and resource values. No areas are identified as primarily for oil and gas development; only the Whiskey Mountain and East Fork ACECs are closed to leasing. See Table 4.18, "Total Acres of Federal Mineral Estate Open, Open with Constraints, and Closed to Oil and Gas Leasing by Alternative" (p. 641) for acres open, areas open with certain constraints, and areas closed for leasing. Areas withdrawn from locatable mineral entry are usually managed as an NSO for oil and gas or closed.

4.2.4.3.2.2. Resources

Under Alternative A, restrictions and constraints on oil and gas development result from management for the protection of resources. The most wide-ranging adverse impacts to oil and gas leasing from management of resources under Alternative A result from wildlife TLS where overlapping moderate constraints become a major constraint (although not identified as an NSO), and cultural resource impact mitigation.

As a result of the oil and gas constraints under Alternative A, projected drilling is reduced from the baseline unconstrained projections. The baseline scenario projects 2,367 federal wells could be drilled in the planning area. These include 1,849 conventional wells and 518 CBNG wells. Under Alternative A, 2,274 wells are projected, comprised of 1,794 conventional wells and 480 CBNG wells. This represents a decrease from the baseline, or 55 fewer federal conventional wells and 38 fewer federal CBNG wells.

Alternative A does not require any MLPs, so there are no adverse impacts to the oil and gas programs through limitations imposed by an MLP.

Management of surface resources resulting in adverse impacts to oil and gas development range from air quality, soil, water, grasslands/shrublands, riparian-wetlands, invasive pests, fish, wildlife, special status plants, special status fish, special status wildlife, to cultural, paleontological, and visual resources.

Wyoming air quality standards set limits on emissions, GHGs, and particulates from construction including drilling of wells and transportation. Limiting emissions would result in an adverse impact to oil and gas development by slowing the pace of development and increasing the costs associated with mitigating the emissions, and would require special management limiting emissions associated with transportation. Management under Alternative A is the least restrictive available that still complies with the CAA.

Management of soil resources under Alternative A would adversely impact oil and gas development by requiring movement of proposed locations and roads around slopes greater than 25 percent and avoiding areas of limited reclamation potential. The largest impact from managing soil resources is from an increase in costs of interim and final reclamation in areas of limited reclamation potential.

Water resource management would adversely impact development through increased costs associated with additional road and well pad construction design to avoid impacts from storm water discharges and the costs of additional surface casing to protect groundwater, and would cause more expensive management of production water. Management of water resources would result in a qualitative impact to development and would not affect the number of wells planned over the planning cycle.

Riparian-wetland area resource management prohibits surface-disturbing activities within 500 feet of surface water and riparian-wetlands unless the impacts can be mitigated; the areas are managed using an NSO. A setback of 500 feet would not affect the number of wells necessary to develop oil and gas. Oil and gas wells can be sited outside riparian-wetland areas and adequately recover the oil and gas resources.

Management of fish, wildlife, special status plants, special status fish, and special status wildlife would adversely impact development through implementation of TLS, CSUs, and NSOs. In virtually all parts of the planning area, development activities are delayed or relocated for the protection of big game winter range, raptor nesting areas, parturition areas, and special status wildlife. Relocation of development proposals is required for special status fish and special status plants. Implementing timing restrictions and/or relocating proposed roads and project locations could make projects either uneconomical or unattractive to potential operators.

Management of greater sage-grouse, a high-profile special status species, under Alternative A does not incorporate the Core Area concept and applies a ¼-mile buffer around greater sage-grouse leks. Nesting areas are avoided by 2 miles. Alternative A does not specially manage the areas identified by the Wyoming Governor as the greater sage-grouse Core Area and has no density or disturbance caps in those areas or any other. Therefore, the adverse impacts to the oil and gas program are limited.

Cultural and paleontological resource management under Alternative A would adversely impact oil and gas development and can result in avoidance areas and additional costs associated with monitoring. Cultural and paleontological resource protections would require limited relocation or redesign of facilities, roads, and operations, limiting development, but are unlikely to preclude development or reduce the number of wells.

VRM adversely impacts oil and gas development if visual resource objectives cannot be achieved and development is precluded. VRM could also increase costs of development, but these are not considered adverse impacts to oil and gas unless development is precluded or well numbers are reduced on a site-specific basis. Adverse impacts to oil and gas under Alternative A come from management such as NSO in Red Canyon to protect important scenic vistas and other values. These adverse impacts cannot be quantified in this analysis because they are site specific.

4.2.4.3.2.3. Resource Uses

For the most part, management for the development of other resource uses would not adversely impact oil and gas development under Alternative A. Designating ROW exclusion and avoidance areas would result in adverse impacts to oil and gas development by prohibiting or limiting ROW authorizations for roads, pipelines, or other infrastructure that could be necessary for the development of oil and gas resources. Beneficial impacts would result from concurrent resource use development (so long as one resource use development does not legally impede the other) by building infrastructure such as roads and transmission lines.

Management of other resource uses under Alternative A would not adversely impact oil and gas development because there are few limiting restrictions. Avoidance areas for major ROW in ACECs already closed or managed as an NSO for oil and gas due to resource protection needs would not result in additional adverse impact. Under Alternative A, these adverse limitations on resource uses are qualitatively not substantial.

Alternative A does not have any recreation management that would adversely impact oil and gas development. Alternative A does not close any area to motorized vehicle traffic except in the Castle Garden area and in two ACECs. No area with moderate or high potential for oil and gas is closed to motorized vehicle travel.

Because Alternative A does not impose a disturbance cap on areas important to greater sage-grouse, there would be no adverse impacts to oil and gas development from surface disturbance caused by other resource uses (e.g., uranium development or ROWs).

4.2.4.3.2.4. Special Designations

Resource values managed using special designations under Alternative A would adversely impact oil and gas development in special designations that have oil and gas prescriptions in areas with oil and gas potential. Under Alternative A, 13,207 surface acres are closed to leasing because of ACECs and 95,090 acres are NSO, including 27,728 acres for Congressionally Designated Trails. These areas have low to no potential for oil and gas resources. Alternative A does not recommend any waterways as suitable for inclusion in the NWSRS but protects eligible waterways under the interim management prescriptions.

4.2.4.3.3. Alternative B

4.2.4.3.3.1. Program Management

Alternative B manages the oil and gas program to avoid adverse impacts to other programs, particularly wildlife. Greater sage-grouse Core Area is closed to new oil and gas leasing. However, the areas of highest potential for oil and gas are not included in the greater sage-grouse Core Area which limits the adverse impacts resulting from this constraint. But, lands outside the Core Area are managed to avoid adverse impacts to greater sage-grouse through NSO stipulations within 0.6 mile of a greater sage-grouse lek and development timing limitations in nesting habitat. Alternative B applies timing limitations to oil and gas operations and maintenance (O&M) activities. Alternative B would result in the most adverse impacts to oil and gas operations of any of the alternatives. However, much of the area closed to oil and gas leasing has low to no potential for oil and gas. Areas that were identified for management with an MLP to reduce resource conflicts are, instead, closed to leasing under Alternative B which is a more adverse impact to oil and gas than the constraints that could be applied under an MLP.

4.2.4.3.3.2. Resources

Under Alternative B, restrictions and constraints on oil and gas development result from management for the protection of other resources. The most wide-ranging adverse impacts to oil and gas development result from greater sage-grouse protections.

In areas open to oil and gas leasing, all leases are subject to standard lease stipulations. All areas open to geophysical exploration are subject to identified COAs, except for lands identified as closed or subject to major constraints. Under Alternative B, geophysical exploration is constrained by limiting motorized travel and restrictions on surface-disturbing and disruptive activities. These restrictions to geophysical exploration would reduce the number of projects developed because geophysical information provides data needed to commit to the high cost of oil and gas exploration and development. Under Alternative B, 1,898,090 surface acres are closed or have major restrictions for geophysical exploration. The areas unavailable to geophysical exploration are identified as low, very low, and no potential for oil and gas resources. Alternative B closes the most areas to geophysical operations and therefore would result in the most adverse impacts to the oil and gas program.

Under Alternative B, 32,952 acres of federal mineral estate are open to oil and gas leasing subject to the terms and conditions of the standard lease form with major constraints. Alternative B has the fewest acres open to oil and gas operations and the most acres open with moderate and major constraints. The *Socioeconomic Resources* section addresses the economic impacts of this restrictive management.

As a result of the oil and gas constraints under Alternative B, projected drilling is reduced from the baseline unconstrained projections. The baseline scenario projects 2,367 federal wells could be drilled in the planning area (1,849 conventional wells and 518 CBNG wells). Under Alternative B, 1,528 federal wells are projected (1,439 conventional wells and 93 federal CBNG wells). This represents a decrease from the baseline of 321 fewer federal conventional wells and 425 fewer federal CBNG wells. This analysis does not address limits on oil and gas development because of surface disturbance caps (discussed below), which can only be calculated on a site-specific basis.

Management of surface resources resulting in limiting oil and gas development range from air quality, soil, water, grasslands/shrublands, riparian-wetlands, invasive pests, fish, wildlife, special status plants, special status fish, special status wildlife, to cultural, paleontological, and visual resources.

Wyoming air quality standards set limits on emissions, GHGs, and particulate matter from construction. Limiting emissions would adversely impact oil and gas development by slowing the pace of development or precluding development for at least some period of time. Under Alternative B, the BLM will cooperate with the Wyoming DEQ to implement the Wyoming air quality standards and be proactive in reducing and managing emissions below state limits. This would result in a short-term adverse impact to oil and gas development by potentially limiting the amount of development. A beneficial impact would result if air quality in the region improves, allowing oil and gas development without air quality restrictions.

Management of soil resources under Alternative B would adversely impact oil and gas development by requiring the movement of proposed locations and roads on slopes greater than

15 percent outside areas identified as having high and moderate potential for oil and gas, and 25 percent inside areas identified as having high and moderate potential for oil and gas. Alternative B also prohibits development in soils identified as LRP. Soil management under Alternative B would result in a relatively small adverse impact to oil and gas development.

Water resource management under Alternative B would adversely impact oil and gas development through prohibiting road crossings in floodplains and riparian-wetland areas of low, very low, and no potential for oil and gas (because standard stipulations are applied in areas with higher oil and gas potential). However, the potential number of wells identified in the low, very low, and no potential areas, is relatively small.

Alternative B increases the setback from riparian-wetlands from 500 feet to 1,320 feet in areas of low to no potential for oil and gas, which would not result in any substantial adverse impact because most drilling operations would be able to accommodate the setback distance and still adequately recover the oil and gas resources.

Management of the Little Red Creek Complex near Dubois as non-WSA land with wilderness characteristics under Alternative B would not adversely impact the oil and gas program, since there is very low to no oil and gas potential in the area.

Management of fish, wildlife, special status plants, special status fish, and special status wildlife under Alternative B would adversely impact development through closure of areas to oil and gas leasing, and implementing major restrictions through TLS, CSUs, and NSOs. To manage and protect sensitive species in the Dubois area, oil and gas leasing is closed under Alternative B. This closure would adversely impact oil and gas development in the Dubois area. However, the RFD identifies the area as having a very low potential for oil and gas.

Under Alternative B, approximately 66,661 acres with very low potential for conventional oil and gas are closed and 49,156 acres with very low potential for CBNG potential are closed. These closures reduce the potential number of new wells by 5.8 conventional and 4.2 CBNG wells. See Table 4.18, "Total Acres of Federal Mineral Estate Open, Open with Constraints, and Closed to Oil and Gas Leasing by Alternative" (p. 641) for a comparison of total acreage closed to oil and gas leasing under Alternative B to Alternative A. See the *Socioeconomic Resources* section for an analysis of the economic impact associated with these closures.

Alternative B manages areas identified as having high and moderate potential for oil and gas using existing (Alternative A) management stipulations, except within the boundaries of the proposed Government Draw/Upper Sweetwater Sage-Grouse ACEC, which is closed to leasing. This closure adversely impacts oil and gas leasing. See the *Socioeconomic Resources* section for an analysis of the economic impact associated with this closure.

In virtually all parts of the planning area, development activities are delayed or relocated for the protection of big game winter range, raptor nesting areas, parturition areas, and special status wildlife. Compared to Alternative A, Alternative B would confer some beneficial impacts to oil and gas development through the implementation of species-specific TLS for raptors where species-specific dates reduce the impact of overlapping stipulations from major to moderate constraints.

Compared to Alternative A, greater sage-grouse management under Alternative B would result in substantially more adverse impacts to oil and gas development. Alternative B manages areas utilizing the Core Area identified by the Governor of Wyoming. The Core Area is closed to oil and gas leasing, and development of existing leases must meet density limitations and a surface disturbance cap that considers disturbance from all resource uses on public, state, and private lands. Inside and outside the Core Area, the buffers around leks are substantially larger under Alternative B than under Alternative A thus preventing surface disturbance in approximately two and one half times the acres as Alternative A. While the adverse impacts from the disturbance cap can be calculated only on a site-specific basis, the disturbance cap has the potential to result in substantially more adverse impacts to oil and gas development than Alternative A, which does not impose such a limitation. However, the surface caps are applied in areas of lower oil and gas potential. Adverse impacts to oil and gas development from the increased lek buffer were considered when calculating the decrease in the baseline unconstrained projection identified above.

Under Alternative B, seasonal protections for wildlife are expanded to include O&M activities when they would be detrimental to wildlife. While this management would result in a potential loss of income to operators because they will either not be able to complete a well for production or will not be able to resume production from a well shut in due to mechanical problems, it would not preclude development or limit the number of wells and would result in no more adverse impacts than management under Alternative A, which does not have timing limitations on O&M.

VRM in Alternative B has more acres managed to VRM Class I and II objectives than under Alternative A; the more restrictive VRM would likely have more adverse impacts than applying lower class objectives. However, VRM does not in and of itself preclude oil and gas development, but requires that development be designed and mitigated so as to meet VRM objectives. It is not possible to quantify the adverse impacts to oil and gas development from the more restrictive VRM compared to Alternative A. Impacts would be site dependent, although VRM under Alternative B would be likely to result in some additional adverse impacts over Alternative A. However, because most oil and gas potential is in areas already disturbed and therefore inventorying at a lower VRM Class, it is likely that VRM under Alternative B would result in little adverse impact to oil and gas development under any alternative.

4.2.4.3.3.3. Resource Uses

In general, management of other resource uses under Alternative B would not result in restrictions and constraints on oil and gas development because areas identified as having high and moderate potential for oil and gas are managed under existing management (Alternative A) stipulations except in the greater sage-grouse Core Area. Under Alternative B, the impacts of all other resource uses to oil and gas development, including in areas of moderate and high potential, would be the same as under Alternative A.

Restrictions under Alternative B that limit acres open to surface-disturbing activities regardless of the program (ROW, locatable minerals, industrial wind-energy development) would result in a beneficial impact to oil and gas development in greater sage-grouse Core Area outside the Government Draw/Upper Sweetwater Sage-Grouse ACEC or within the ACEC for existing leases. Alternative B closes the ACEC to new leasing (see *Special Designations*), but it also closes the ACEC to all other mineral and ROW activities and new rangeland improvements. Although Alternative B applies a cap on surface disturbance, which neither Alternative A nor Alternative C does, Alternative B limits on non-oil and gas development make it less likely that the disturbance cap would be reached.

Alternative B management of other resource uses to protect greater sage-grouse, particularly closing all of the greater sage-grouse ACEC to surface disturbance, including locatable minerals withdrawals, make it less likely that the greater sage-grouse would be listed under the ESA than under Alternative A and much less likely than under Alternative C.

Restrictions for handling produced water, which would avoid surface discharge of produced water in all new oil and gas development projects, would adversely impact any new development in areas with low and very low potential for oil and gas and could conflict with regulations in Onshore Oil and Gas Order Number 7, Disposal of Produced Water, which makes reinjection the preferred method but allows surface discharge. In areas of high and moderate oil and gas potential and in existing development areas, produced-water handling is managed under existing (Alternative A) management prescriptions. By prohibiting water discharge for new development in the low and very low potential areas, produced-water handling costs could make new discovery uneconomical or be a disincentive to develop oil and gas resources; this would result in the loss of recoverable reserves.

Management of resource uses that could limit oil and gas development include ROWs and corridors, livestock grazing, and recreation. Other resource uses could enhance the development of oil and gas resources, such as locatable minerals, other leasable minerals, mineral materials sales, and ROWs and corridors. Impacts would be similar to impacts identified under Alternative A, except for the reduction in other mineral development and ROWs, which would not benefit oil and gas development.

Under Alternative B, additional recreation areas and special recreation management areas (SRMAs) increase the acres that would adversely impact oil and gas development. Recreation management under Alternative B limits mineral and realty actions within existing recreation sites identified under Alternative A and the following sites managed as closed to leasing: Castle Gardens Archeology Site (78 acres), Devils Gate Interpretive Site (112 acres), Martins Cove Trail (927 acres), Split Rock Rest Interpretive Site (242 acres), and Steamboat Lake Overlook (128 acres). These designated recreation sites are small and oil and gas could be developed through directional drilling techniques; therefore, the impact to oil and gas development from these recreation sites would be small. In addition, these recreation areas are in areas with very low or no potential for oil and gas, and would therefore result in negligible impacts to the overall oil and gas development in the planning area.

4.2.4.3.3.4. Special Designations

Resource values managed as special designations under Alternative B would result in more adverse impacts to oil and gas development than under Alternative A, because more acres in special designations are closed or managed as an NSO under Alternative B. In addition, approximately 1,772,943 acres of mineral estate, less the approximate 66,661 acres administratively closed in the Dubois area, are closed to oil and gas leasing in identified special designations. These special designation areas would result in adverse impacts when areas were closed or made closed for oil and gas leasing whereby directional drilling would not be feasible. Alternative B manages all of the NWSRS-eligible waterways as suitable for inclusion in the NWSRS. Although theoretically an adverse impact to the oil and gas program, this management would result in little actual impact because only ¼ mile on each side of the segment is NSO for oil and gas development. The segments occur mostly in areas with very low or no potential for oil and gas and could be directionally drilled.

4.2.4.3.4. Alternative C

4.2.4.3.4.1. Program Management

Alternative C manages the oil and gas program to maximize oil and gas production and minimize constraints from other programs, such as wildlife. While all alternatives manage oil and gas considering other resources, such as the greater sage-grouse – a BLM sensitive species, Alternative C minimizes restrictions from the management of other resources. Like Alternative A, Alternative C does not apply additional prescriptions through MLPs.

4.2.4.3.4.2. Resources

Under Alternative C, management of other resources would result in the least impact to oil and gas development of any of the alternatives. This alternative minimizes impacts to oil and gas leasing from management of other resources and manages oil and gas development with standard lease stipulations, TLS, and CSUs. Like Alternative A, there are no MLPs applied, so no constraints above standard stipulations are applied.

As a result of the oil and gas constraints under Alternative C, projected drilling is reduced from the baseline unconstrained projections. The baseline scenario projects 2,367 federal wells could be drilled in the planning area (1,849 conventional wells and 518 CBNG wells). Under Alternative C, 2,284 federal wells are projected (1,800 conventional wells and 484 federal CBNG wells). This represents a decrease from the baseline, or 49 fewer federal conventional wells and 34 fewer federal CBNG wells.

Wyoming air quality standards set limits on emissions, GHGs, and particulate matter from construction. Limitations to oil and gas development from management of air quality would be fewer than identified for Alternative B and the same as Alternative A.

Management of soil resources under Alternative C would adversely impact oil and gas development by requiring movement of proposed locations and roads around slopes greater than 25 percent. This impact would be the same as Alternative A and less adverse than Alternative B. However, the slope limitation would result in very few actual impacts to oil and gas operations because well locations can be changed to accommodate the slope restriction.

Water resource management under Alternative C is the least restrictive of any alternative and would allow development and surface disturbance in riparian-wetlands so long as mitigation is adequate to comply with CWA provisions. This different management would result in fewer adverse impacts than Alternative A, B, or D, because it is relatively easy to relocate wells to accommodate setbacks.

Alternative C is the least restrictive concerning setbacks from riparian-wetland areas. Management requires a setback of 500 feet from riparian-wetland areas. However, less distance could be authorized if it is shown that equivalent protection of the surface water and riparian-wetland areas could be accomplished. Impacts to oil and gas development under Alternative C restrictions would be less than under alternatives A and B.

Management of fish, wildlife, special status plants, special status fish, and special status wildlife under Alternative C would adversely impact oil and gas development through closure of areas to oil and gas leasing, and implementing restrictions through TLS, CSUs, and NSOs. Under

Alternative C, oil and gas leases have stipulations for the protection of fish, wildlife, special status plants, special status fish, and special status wildlife, but these stipulations have the lowest level of restrictions on oil and gas development that meets BLM's obligation for minimum resource protections. Site-specific applications of moderate stipulations would not adversely impact oil and gas development beyond a very limited amount. The difference in moderate and major constraints among alternatives A, B, and C are reflected in the variation from baseline discussed above. Alternative C has the least reduction from baseline.

Cultural and paleontological resource management under Alternative C would not be likely to adversely impact oil and gas development because the resource can generally be avoided. Development would continue, with impacts similar to Alternative A, using minimum restrictions so long as adverse impacts are avoided for National Register of Historic Places (NRHP) eligible properties and activities proceed in accordance with current Wyoming State Protocol and NHPA regulations.

VRM adversely impacts oil and gas development, as addressed under Alternative A. Under Alternative C, most of the planning area (97 percent) is managed as VRM Classes III and IV, which would result in no adverse impacts to oil and gas development.

4.2.4.3.4.3. Resource Uses

Under Alternative C, there would be few adverse impacts to oil and gas development from management for the development of resource uses in programs such as locatable minerals and ROWs.

Restrictions for handling produced water under Alternative C would result in the same impacts as Alternative A. Alternative C manages produced-water handling under existing management prescriptions (Alternative A) identified in regulations in Onshore Oil and Gas Order Number 7, Disposal of Produced Water. This is less restrictive than Alternative B, which prohibits water discharge for new development in areas with low and very low potential for oil and gas.

Management of resource uses that could limit oil and gas development include ROWs and corridors, livestock grazing, and recreation. Other resource uses could enhance the development of oil and gas resources, such as locatable minerals, other leasable minerals, mineral materials sales, and ROWs and corridors by providing infrastructure such as roads and powerlines that can be used for oil and gas developments. Impacts to oil and gas development under Alternative C would be similar to impacts under Alternative A and substantially less than under Alternative B.

Recreation areas and SRMAs do not restrict oil and gas resources. Therefore, management of recreation resource uses would not impact oil and gas development.

4.2.4.3.4.4. Special Designations

Resource values managed as special designations under Alternative C would not adversely impact oil and gas development in the planning area. Alternative C does not manage any areas as ACECs, so all areas would be open to oil and gas leasing with standard stipulations. Congressionally Designated Trails are NSO for ¼ mile or less on either side of the trails, which would not preclude oil and gas development. Alternative C does not manage any waterways to maintain their suitability for inclusion in the NWSRS.

4.2.4.3.5. Alternative D

4.2.4.3.5.1. Program Management

Alternative D manages the oil and gas program to maximize oil and gas production in areas with moderate and high potential for oil and gas while avoiding adverse impacts to other programs, particularly wildlife. The areas with the highest potential for oil and gas are not included in the greater sage-grouse Core Area, but are still managed to protect greater sage-grouse leks and impose timing limitations on development in nesting habitat. Alternative D has Designated Development Areas (DDAs) for oil and gas with different reclamation objectives. Outside DDAs, Alternative D applies TLS to oil and gas O&M activities if those activities would be detrimental to wildlife. Alternative D would result in the second most adverse impacts to oil and gas operations of any of the alternatives behind Alternative B. Alternative D uses an MLP in the Beaver Rim area (143,448 acres) as a tool to limit resource conflicts.

4.2.4.3.5.2. Resources

Under Alternative D, restrictions and constraints on oil and gas development result from management for the protection of other resources. The most wide-ranging impacts to oil and gas leasing from management of other resources result from greater sage-grouse protections and from management that closes the area to oil and gas leasing or makes it an NSO for the protection of wildlife, or applies cultural resources mitigation measures. This management is primarily in *Special Designations* (see below). The entire Dubois area is also closed to oil and gas development to benefit wildlife, including special status species. Adverse impacts to oil and gas result from the closing of approximately 8,500 acres to leasing to the east of Boysen Reservoir to benefit the Park to Park Highway, recreational values associated with the State Park, viewshed, water quality and wildlife and special status species habitat. Because of very low potential, the resulting impact would unlikely be more than moderate.

In areas open to oil and gas leasing, all leases are subject to standard lease stipulations. Additional stipulations may be applied in some areas to the lease or as COAs. All geophysical exploration is subject to identified COAs adopted at the project level. Under Alternative D, geophysical exploration is constrained by limiting motorized travel and restrictions on surface-disturbing and disruptive activities. Limits on geophysical exploration would reduce oil and gas development because producers are unlikely to invest in development without supporting data. Alternative D closes or places major restrictions on geophysical exploration on 1,898,090 surface acres which is the second highest restriction of the alternatives, exceeded only by Alternative B. The areas unavailable to geophysical exploration under Alternative D are identified as having low, very low, and no potential for oil and gas resources, so the impact of these closures, while adverse, could have little actual effect.

Under Alternative D, 32,952 acres of federal mineral estate are open to oil and gas leasing subject to the terms and conditions of the standard lease form and major constraints. Major constraints to oil and gas exploration and development are the same constraints identified and described under *Impacts Common to All Alternatives*, such as NSOs or overlapping TLS. These restrictions would adversely impact oil and gas exploration and development by limiting or prohibiting development in these areas or requiring certain drilling techniques, BMPs, or impact mitigation measures. Alternative D includes the second fewest acres open to oil and gas operations and the most acres open with moderate and major constraints. The *Socioeconomic Resources* section addresses the economic impacts of this restrictive management.

In contrast to the other alternatives, Alternative D requires the application of an MLP in the Beaver Rim area, east of the Beaver Rim ACEC established in the existing plan. MLPs have adverse impacts to the oil and gas program to the extent that development is limited or constrained. However, the MLPs would not preclude development or impose a major constraint such as NSO. Instead, the MLPs would reduce conflicts between development and identified resource values. The adverse impacts to oil and gas are comparable to, but somewhat more restrictive than, moderate constraints applied in other areas under Alternative D. These are more adverse than the impacts under alternatives A and C but less adverse than the lease closure under Alternative B. The reader should note that the MLP provisions were added after the RFD for oil and gas was done and will be included when the final RFD is done prior to the final EIS is issued and the impact evaluated. The BLM assumes that there will be little economic impact from this management in light of the relative low potential and that oil and gas development is still allowed, albeit with more constraints.

As a result of the oil and gas constraints under Alternative D, projected drilling is reduced from the baseline unconstrained projections of 2,367 federal wells (1,849 conventional wells and 518 CBNG wells). Under Alternative D, 2,125 federal wells are projected (1,719 conventional wells and 406 federal CBNG wells). This represents a decrease from the baseline, or 130 fewer federal conventional wells and 112 fewer federal CBNG wells.

Management of surface resources that result in limiting oil and gas development range from air quality, soil, water, grasslands/shrublands, riparian-wetlands, invasive pests, fish, wildlife, special status plants, special status fish, special status wildlife, to cultural, paleontological, and visual resources. Constraints on oil and gas leasing are also established for the Beaver Rim area by the MLP. The 29,505 acres with NSO stipulations have the most adverse impacts, although the low potential in the area limits the degree of impacts. Those portions of the area with oil and gas development potential recognized by industry are already leased; the NSO stipulation would apply only if the leases ended. The areas for which NSO stipulations apply include the areas that are NSO under all alternatives for the protection of the ESA-listed threatened plant species desert yellowhead. The adverse impacts associated with this management are greater than alternatives A and C.

The remainder of the MLP area (113,943 acres) is subject to CSU stipulations. The impact to oil and gas leasing in this area would be somewhat more adverse than under either Alternative A or C because the timing of development and locations would be more constrained. However, this management is far less adverse than under Alternative B which closes almost all of the area to oil and gas leasing for the protection of greater sage-grouse. The oil and gas potential in the CSU portion of the MLP area is low to none; therefore, the adverse impacts from MLP management in the area would likely be modest. The other aspects of MLP management such as protections for paleontological resources or Native American consultation could result in minor adverse impacts such as relocation of facilities. Requiring no more than 5 percent disturbance in the township in which a leased parcel in the Beaver Rim MLP is located until interim reclamation goals are achieved, would result in adverse impacts to oil and gas management but would not preclude full recovery of oil and gas. Designation of two ROW corridors through the MLP would beneficially impact oil and gas by expediting approval of needed utility and transportation grants. The limitations on disturbance would have more adverse impacts than under either Alternative A or C which have no similar management. The economic consequences of the MLP management will be revised between the release of the Draft RMP and EIS and the release of the Proposed RMP and Final EIS; the MLP management was identified after the modeling that established the RFD for the Draft RMP and EIS was conducted.

Wyoming air quality standards set limits on emissions, GHGs, and particulate matter from construction. Limiting emissions would adversely impact oil and gas development by slowing the pace of development and increasing the costs associated with mitigating emissions, as identified under Alternative A. Air quality management under Alternative D is the same as under alternatives A and C.

Management of soil resources under Alternative D is similar to alternatives A and C, but would result in somewhat more adverse impacts to oil and gas development, because on slopes between 15 and 25 percent outside of DDAs, more roads and other developments might need to be relocated to avoid damage to soils. However, BMPs could require relocations in any case. Alternative D would result in fewer impacts to oil and gas development from management of soil resources than Alternative B, which not only prohibits surface disturbance on slopes greater than 15 percent but also restricts development in soils with LRP outside of DDAs. While Alternative D (as well as alternatives A and C) would theoretically result in fewer adverse impacts to oil and gas development, it is likely to result in limited actual adverse impacts because of the low or no potential for oil and gas outside of DDAs. A primary area where the difference in impacts could be important is in the Green Mountain area.

Water resource management under Alternative D, like Alternative A, would result in slightly fewer adverse impacts to oil and gas development than Alternative B, because road crossings in floodplains and riparian-wetland areas would be managed. However, the potential number of wells identified in these areas is relatively small.

Alternative D includes the same setback from riparian-wetlands as alternatives A and C (which has some additional flexibility). Therefore, adverse impacts to the oil and gas program would be the same as under Alternative A, slightly less than Alternative C, and less than Alternative B. However, this management is applied only in areas other than those with high and moderate potential for oil and gas, as identified under *Impacts Common to All Alternatives*. Generally, operators are able to accommodate riparian-wetland setbacks, so there would be limited adverse impacts.

Management of the Little Red Creek Complex near Dubois as non-WSA land with wilderness characteristics would not adversely impact the oil and gas program because there is no oil and gas potential in that area.

Alternative D management of fish, wildlife, special status plants, special status fish, and special status wildlife would adversely impact oil and gas development through closing areas to oil and gas leasing, and implementing major restrictions in the form of TLS, CSUs, and NSOs. To manage and protect sensitive species in the Dubois area, like Alternative B, Alternative D closes the area to oil and gas leasing. This closure would adversely affect oil and gas development in the Dubois area; however, the RFD identifies the area as having very low potential for oil and gas. Under Alternative D, approximately 66,661 acres with very low potential for conventional oil and gas are closed and 49,156 acres of with very low CBNG potential are closed. These closures reduce the potential number of new wells by 5.8 conventional and 4.2 CBNG wells. See the *Socioeconomic Resources* section for an analysis of the economic impacts associated with these closures.

Alternative D manages areas identified as having high and moderate potential for oil and gas, including DDAs, using existing (Alternative A) management stipulations, except within the boundaries of the Greater Sage-Grouse Reference and Education Area, which is managed as NSO, a substantial adverse impact. Alternative D would impose more restrictions on oil and gas development associated with greater sage-grouse management in the Core Area than alternatives A and C, but fewer than Alternative B, depending on existing surface disturbance, regardless of which program caused the disturbance. While most areas with moderate and high potential for oil and gas are outside the Core Area, greater sage-grouse management would adversely impact existing and projected oil and gas development. The degree of this adverse impact can only be quantified on a site-specific basis, but management under Alternative D could result in the relocation of or limitations to oil and gas development because of existing, unreclaimed disturbance. For example, historic mining disturbances such as unreclaimed uranium mines would be included in the calculation for purposes of meeting the Alternative D 5-percent cap. This would be less adverse than the 2.5-percent cap under Alternative B, but more adverse than alternatives A and C.

In many parts of the planning area, development activities are relocated for the protection of big game winter range, raptor nesting areas, parturition areas, and special status wildlife. However, resulting adverse impacts to oil and gas development under Alternative D would be more similar to Alternative A than to Alternative B outside the Core Area. Some beneficial impacts would result through the implementation of species-specific TLS for raptors, but the impact of this management is generally not considered a beneficial impact unless it results in changing overlapping TLS that would otherwise be NSOs. As under Alternative B, Alternative D expands seasonal protections for wildlife to include O&M activities when they would be detrimental to wildlife. This could result in an adverse economic impact to operators, but is not considered an adverse impact to the oil and gas program because development would not be precluded.

Cultural and paleontological resources management under Alternative D would adversely impact oil and gas development although with fewer adverse impacts than under Alternative B. Most other restrictions from cultural and paleontological resources protections would not be any more restrictive or result in any more impacts than those under alternatives A and B.

VRM adversely impacts oil and gas development, as addressed under Alternative A, and could result in substantial impacts in VRM Class I, II, and III areas. Alternative D includes the second most areas managed with VRM objectives that could adversely impact oil and gas development. This is especially true in connection with VRM objectives for Congressionally Designated Trails (discussed below under *Special Designations*).

4.2.4.3.5.3. Resource Uses

In general, management for the development of resource uses under Alternative D would not adversely impact oil and gas development, and there could be beneficial impacts in the form of increased infrastructure such as roads and powerlines built to support non-oil and gas resource use. However, in the greater sage-grouse Core Area, Alternative D restrictions on surface disturbance by other uses such as phosphate leasing, uranium mines, ROW, and extensive disturbance from rangeland improvement projects, would beneficially impact the oil and gas development program because those restrictions reduce the amount of newly disturbed acres that would be counted toward the disturbance cap applied to energy products such as oil and gas. Alternative D includes more areas closed to non-oil and gas surface disturbance for resource uses than Alternative A or C; therefore, Alternative D would result in more beneficial impacts to oil and gas development than Alternative A or C.

In restricting road and ROW development, Alternative D would adversely impact oil and gas development by limiting the ability of operators to construct infrastructure and supply equipment needed to support their operations. The limits on these uses adversely impacts oil and gas development, although less so than the limits under Alternative B.

Restrictions for handling produced water under Alternative D are the same as under alternatives A and C, which manage produced water in accordance with regulations in Onshore Oil and Gas Order Number 7, Disposal of Produced Water (Alternative A restrictions). This would result in fewer adverse impacts to oil and gas development than Alternative B, which could make new development in areas with low and very low potential for oil and gas less likely. The costs of handling produced water could still make new discovery uneconomical or be a disincentive to develop, resulting in the loss of recoverable reserves.

Management of resource uses that could limit oil and gas development include ROWs and corridors, livestock grazing, and recreation. As previously discussed, in the greater sage-grouse Core Area, any surface disturbance from resource uses that contributes to the 5 percent cap has the potential to adversely impact the oil and gas program by making it more likely that caps would preclude oil and gas development. The disturbance caps include disturbances not permitted by the BLM, such as disturbances on private or state lands and county roads.

Outside the greater sage-grouse Core Area, Alternative D impacts to the oil and gas program would be similar to the impacts identified for Alternative A. Alternative D includes more acres closed for the benefit of recreation, which would result in the same adverse impacts to oil and gas development as Alternative B.

Under Alternative D, additional recreation areas and SRMAs would increase adverse impacts to oil and gas development. Recreation management under Alternative D limits mineral and realty actions within existing recreation sites identified in Alternative A and the following additional sites that are managed as closed to leasing: Castle Gardens Archeology Site (78 acres), Devils Gate Interpretive Site (112 acres), Martins Cove Trail (927 acres), Split Rock Rest Interpretive Site (242 acres), and Steamboat Lake Overlook (128 acres). These designated recreation sites are small and oil and gas resources could be developed through directional drilling techniques. Therefore, the impact to oil and gas development from management of recreation resource uses would be small. These recreation areas are in areas with very low or no potential for oil and gas; therefore, they would result in negligible impacts to overall oil and gas development in the planning area.

4.2.4.3.5.4. Special Designations

Under Alternative D, resource values managed as special designations would adversely impact oil and gas development in the planning area depending upon the type of special designation. The ACEC management is the same as Alternative A so the adverse impacts would be the same and much more adverse than Alternative C. In those ACECs that are expanded in size from under Alternative A, the adverse impact would be correspondingly greater. However, the adverse impact would likely be limited because the oil and gas potential in areas with ACECs is low to none, except for the Green Mountain ACEC. In the Dubois area, the impacts under Alternative D would be more adverse because the entire area including the special designation areas are closed to leasing. In Dubois, the adverse impacts would be comparable to those under Alternative B.

Alternative D manages two NWSRS-eligible waterways as suitable WSRs, but this would not adversely affect oil and gas development because only ¼ mile on each side of the segment is NSO for oil and gas. The NWSRS-eligible segments are in areas with low or no potential for oil and gas, but they likely could be directionally drilled to recover any oil and gas resources. The Heritage Tourism and Recreation Corridor's expansion of the areas subject to NSO and CSU stipulations would adversely impact the oil and gas program but to a limited extent because of the low to no mineral potential in the area.

Alternative D expands the Green Mountain ACEC over Alternative A but less than Alternative B. The acres that were no carried forward under Alternative D would be managed as open to oil and gas subject to an NSO stipulation. For the Green Mountain ACEC, the adverse impacts to the oil and gas program would be the same under Alternative D as B.

Alternative D requires an MLP for the Beaver Rim area, a portion of which would be designated as the expanded Beaver Rim ACEC under Alternative B. The MLP would allow leasing with surface occupancy but would provide additional protections for visual resources and Native American sacred sites. These resource protections would have moderately adverse impacts to oil and gas but much less adverse than the closure of the Beaver Rim area to oil and gas leasing under Alternative B.

4.2.5. Leasable Minerals – Oil Shale

In 2008, the BLM released a Programmatic EIS for Oil Shale and Tar Sands (BLM 2008c) that amended existing plans for Wyoming and other states. The only areas of Wyoming addressed in the Programmatic EIS were the Washakie and Green River Basins in the southwestern part of the state. The southern edge of the planning area was included as oil shale resources; however, the area identified is not considered economically feasible to produce. Additional evaluation and an RMP amendment would be required for the exploration, development, and leasing of oil shale in the planning area. Therefore, impacts to oil shale from management of other resources are not analyzed.

4.2.6. Leasable Minerals – Other Solid Leasable Minerals

The only solid leasable mineral with substantial occurrence and development potential in the planning area is phosphate. Therefore the discussion is restricted to that mineral. Phosphate is only present in the Permian-age Phosphoria Formation and equivalent beds that crop out along the eastern edge of the Wind River Range uplift. Smaller exposures of Phosphoria strata also occur in several isolated areas in the planning area where deformation has uplifted the host formation such as the Sheep Mountain and Conant Creek anticlines, Crooks Mountain near Happy Springs, the Owl Creek Mountains between Copper Mountain and Lysite Mountain, and other scattered areas east of the Wind River Range in the Dubois area.

4.2.6.1. Summary of Impacts

Phosphate resources occur in three main areas in the planning area, and impacts are clear where land use decisions have resulted in designations as either open or closed to solid mineral leasing. Impacts due to seasonal or CSU restrictions are less clear because there has not been any phosphate or other solid mineral leasing activity during the last planning cycle, and the impacts of such restrictions are not understood. Unlike locatable minerals, the decision to make solid leasable mineral resources available for exploration and development at BLM discretion, and the intersection of areas closed or open to phosphate leasing with known areas of phosphate occurrence potential is paramount to understanding impacts to phosphate resources. The alternatives vary in the acres open or closed to phosphate exploration and leasing. Table 4.19, "Phosphate Potential" (p. 659) displays how many acres of mineral estate with phosphate potential are open or closed to phosphate leasing under the alternatives.

Table 4.19. Phosphate Potential

	Alternative A	Alternative B	Alternative C	Alternative D
Acres of Phosphate with Development Potential	42,291	42,291	42,291	42,291
Acres of Phosphate with Development Potential-Open	32,244	2,699	40,570	5,567
Acres of Phosphate with Development Potential-Closed	10,047	39,592	1,721	36,724
Source: BLM 2009a				

Phosphate potential (as defined under *Methods and Assumptions*) in the planning area comprises lands totaling 42,291 surface acres and 60,374 acres of subsurface mineral estate. Under Alternative A, approximately 9,600 acres are specifically closed in the National Natural Landmark (NNL) and the crucial elk winter range in the Red Canyon ACEC. Of this, 86 percent of the acres have phosphate potential. Alternative B closes 39,592 acres of land with phosphate potential (approximately 94 percent of the potential), while Alternative C closes only 1,721 acres. Therefore, Alternative B would result in the largest adverse impact to developing the known phosphate resource, followed by Alternative A. Under the restrictions imposed under Alternative B, there is little likelihood that any exploration or development of phosphate resources would occur anywhere because most of the reserves would be precluded from development. Impacts to phosphate development under Alternative D are approximately that of Alternative A, and only slightly greater than in Alternative C.

The 1,721 acres closed under Alternative C would not be likely to have any substantial bearing on the likelihood of phosphate development. For example, although the acreage of phosphate resource closure under Alternative A is more than under Alternative C, because the closure to phosphate development under Alternative A represents one specific area (Red Canyon) the likelihood of this closure resulting in any material impacts to phosphate development would be small to none.

4.2.6.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Solid mineral exploration activity can take place under either prospecting permits, an exploration license, or by acquiring a lease either by preference right or competitive bidding. Potential operators must obtain a prospecting permit, an exploration license, or a lease from the BLM Wyoming State Office before commencing operations. In the case of prospecting permits or exploration licenses, operators must submit a detailed exploration plan that meets the standards at 43 CFR 3505.45, and the exploration proposal must be analyzed under the NEPA process. Before performing any operations under any solid mineral lease, the operator must submit an operating plan in accordance with 43 CFR 3592.1, and operations proposals must be analyzed under the NEPA process. The surface-disturbing activities allowed (short of an actual mine development) and the resulting impacts to resources are not necessarily, by definition, different under either method.

- Management resulting from the regulatory requirements for cultural resources and threatened and endangered species consultations is identical under all alternatives; these requirements are outside the realm of RMP decision making.
- The BLM issues prospecting permits to explore for leasable mineral deposits on lands where the BLM has determined that prospecting is necessary to determine the existence of a valuable deposit. Applications for prospecting permits are also subject to review for conformance to land use plans, environmental requirements, and unsuitability criteria; therefore, the BLM decision to approve a prospecting permit application is completely at BLM discretion. The total acreage allowed under a phosphate prospecting permit is limited to 2,560 acres; the BLM will not issue prospecting permits if the applicant's phosphate holdings in permits and licenses exceed 20,480 acres nationwide. Prospecting permits for phosphate are issued for an initial 2-year term and could be extended for up to 4 years. The permittee may only remove enough material to prove the existence of a valuable mineral deposit.
- A proven discovery of a valuable deposit of phosphate under a prospecting permit entitles the permittee to a preference right lease. The BLM issues the lease for a period of 20 years subject to readjustment at the end of the 20-year period. The BLM could reject a preference right lease application if it is determined that mining is not the preferred use of the lands in the application. In making this determination, the BLM considers land use plans, unsuitability criteria, any environmental impacts, the purpose of the statute under which the lands were acquired, and whether the surface-management agency (if not the BLM) does not consent to a lease.
- The BLM grants an exploration license only to explore known and unleased phosphate deposits to obtain geologic and environmental information about the deposits. Exploration licenses are granted for a period of 2 years and may not be extended. Upon expiration, the former licensee may apply for a new exploration permit. Exploration licenses confer no right to lease, regardless of the outcome of the exploration effort regarding discovery of phosphate mineralization. Similar to prospecting permits, the BLM decision to approve an exploration license application is completely at BLM discretion.
- Phosphate leases of any type are issued only for lands where the BLM has determined there is a valuable mineral deposit (e.g., in a known leasing area [KLA]), or where prospecting has proven the existence of a valuable mineral deposit. The availability of solid leasable minerals outside existing lease rights are subject to BLM discretion.
- In areas where fluid mineral leasing is stipulated with an NSO, it is assumed that solid mineral leasing would carry the same stipulations. Because exploration mostly requires occupancy of the surface, and surface mining is the preferred method of phosphate development because of the configuration of deposits in the planning area, any NSO stipulation would effectively close the area to phosphate exploration or mining.
- Competitive lease sales may be initiated by an expression(s) of interest or on BLM motion and are issued for areas where there is a known deposit of a valuable leasable mineral. Prospecting permits are not allowed in such areas, but exploration licenses may be granted. Areas held under a lease are limited to 2,560 acres, and lessees are limited to a maximum of 20,480 acres under permits and leases nationwide. Leases will not be issued for unsurveyed lands.
- The Phosphate Leasing Handbook (H-3510-1) states that permits shall not be issued to prospect in Congressionally designated wilderness areas or BLM WSAs, or in an ACEC. The handbook does not address the application of these restrictions to exploration licenses or competitive leasing. However, the solid mineral leasing regulations (43 CFR 3503.10)

state that the Secretary of the Interior may not lease lands the surface-management agency recommends for wilderness allocation, lands in BLM WSAs, or lands in Congressionally designated wilderness areas. Therefore, while not specifically mentioning ACECs, the BLM assumes that new competitive leases, because they can be issued only in KLAs, would not be within the boundaries of an ACEC. Any lease predating the designation of an ACEC would be subject to prior existing rights and would be valid. ACEC management, however, is required to address phosphate leasing for self-nominated parcels.

- Solid minerals development projects that meet certain thresholds in the BLM Department Manual (BLM 2008d), or would result in impacts that cannot be mitigated (making a Finding of No Significant Impact not possible), require NEPA analysis in an EIS. The cost of preparing an EIS is borne by the licensee, permittee, or lease applicant, as required by current cost-recovery regulations.
- Phosphate is the only solid leasable mineral specifically analyzed because there is little information about occurrence of other solid leasable minerals such as salts of sodium (e.g., trona) or potassium (potash). The restrictions and impacts to other solid leasable minerals from management of resources and resource uses are assumed to be the same restrictions and impacts to phosphate resources. All solid leasable minerals are managed under the same regulations and have the same requirements for development. However, specific impacts to solid leasable minerals other than phosphate cannot be determined because the occurrence of such minerals across the planning area is not clear.
- The occurrence potential for phosphate in the planning area as discussed in the Mineral Occurrence and Development Potential Report for the Lander Planning Area (BLM 2009c), is assigned a rating of high with a certainty level of D (H/D). However, only the following phosphate resources are considered to have phosphate potential for the purposes of this analysis: (1) the phosphate resources rated high in favorability and shown on Figure 4-1 of the Mineral Report and (2) the phosphate potential classified as surface resources south and southeast of the Wind River Indian Reservation (WRIR) boundary as shown on Figure 3-9 of the Mineral Report, which includes the part of the phosphate resource from the surface to a depth of 600 feet below land surface (Map 19).
- The potential for phosphate exploration and development is anticipated to be low for the next planning cycle because of the relative thinness of phosphate beds, thickness of overburden, low to moderate grade of phosphate (compared to viable deposits elsewhere in the western phosphate field), and distance to processing facilities in the planning area.

4.2.6.3. Detailed Analysis of Alternatives

4.2.6.3.1. Impacts Common to All Alternatives

The analysis of impacts from management decisions are limited to impacts to areas where solid mineral potentials have been identified. Without potential being identified, the impacts from management cannot be analyzed.

Adverse impacts to exploration and development of solid leasable minerals could result when seasonal timing limitations apply for the protection of wildlife. The intensity of impacts is anticipated to vary by alternative and be proportional to actual demand. It follows that impacts would be potentially greater when there are restrictions on areas with high occurrence or potential than in areas of moderate to low occurrence or potential.

Restrictions on development of solid leasable minerals adversely impact exploration and development activities when locatable minerals are withdrawn because the Lander Field Office manages solid leasable minerals in the withdrawn areas as closed to leasing. The intensity of impacts anticipated from locatable mineral withdrawal vary by alternative and would be proportional to actual demand. It follows that impacts would be potentially greater when there are withdrawals in areas with high occurrence or potential than in areas of moderate to low occurrence or potential.

Beneficial impacts to solid leasable minerals result from management actions that open access to federal mineral estate, including allowing post-FLPMA withdrawals or segregations to expire without seeking new withdrawals or segregations.

Under all alternatives, activities related to solid leasable minerals prospecting, exploration, and development are subject to site-specific analysis before approval. Approval of such activities under any permit, license, or lease would require appropriate mitigation and site-specific reclamation based on a current mining and reclamation plan. Mitigation and a site-specific reclamation measures could prescribe certain activities or mitigation measures that could reduce the economic viability of a mining proposal and result in indirect adverse impacts to operators (e.g., the application of standard mitigation guidelines such as slope restrictions, riparian-wetland setbacks, and timing restrictions to protect BLM-sensitive species). These impacts would vary by alternative.

Under all alternatives, pre-FLPMA (1976) withdrawals do not expire and can be retired only through Congressional action. Accordingly, these withdrawals do not vary by alternative. Withdrawals protect other resource values or public investments (e.g., campgrounds) and these objectives are equally important when considering solid leasable minerals. These pre-FLPMA withdrawals are not addressed further in this section.

There are no designated WSAs in the planning area with phosphate potential.

4.2.6.3.2. Alternative A

4.2.6.3.2.1. Program Management

Alternative A closes approximately 10,047 acres to phosphate exploration and development, which would impact approximately 24 percent of the area with phosphate potential. This closure would prohibit prospecting permits, exploration licenses, and any type of leasing activity. Under Alternative A, the majority of land with phosphate potential would remain open to phosphate development activity.

4.2.6.3.2.2. Resources

For the protection of geologic and visual resources, Alternative A closes approximately 1,440 acres of land with phosphate potential in Red Canyon NNL.

Soil protections under Alternative A prohibit surface disturbance on slopes greater than 25 percent, which is approximately a 14 degree slope. Unless phosphate mining would occur entirely underground with no or minimal need for surface occupancy, small areas along the Wind River Range front would not be available to phosphate development due to slope restrictions. Most of the dip slope along the range front is situated at approximately 12 degrees, but the flanks of stream canyons exceed 25 percent; therefore, phosphate mining in these areas would be prohibited under Alternative A. In addition, approximately 10 percent of the Sheep Mountain and Conant Creek anticlines is effectively closed to surface activity due to slope restrictions under Alternative A.

Alternative A prohibits surface-disturbing activities within 500 feet of surface water, riparian-wetland areas, playas, and 100-year floodplains. These prohibitions would affect phosphate mining on the flanks of stream canyons along the Wind River Range front, but would have little impact on the Sheep Mountain or Conant Creek anticlines.

Alternative A specifically closes approximately 1,375 acres of land with phosphate potential in the Red Canyon area because of wildlife concerns related to elk crucial winter range. In addition, virtually all of the phosphate potential in the Dubois area along the Wind River Range front carries NSO stipulations for oil and gas, which apply to solid mineral leasing as well. Because of the mineral withdrawals in the Dubois area (Whiskey Mountain and East Fork) to benefit wildlife such as bighorn sheep and elk (see Table 4.15, “Acreage of Withdrawals for the Benefit of Habitat, Cultural or Recreational Values” (p. 624) in the *Locatable Minerals* section), it is not likely that phosphate leasing would be allowed in these areas either.

Heritage/cultural concerns in areas with phosphate potential under Alternative A include a mineral withdrawal in Warm Springs Canyon of 557 acres. It is not clear whether this withdrawal specifically applies to solid mineral leasing, but because such leasing is discretionary, it is not likely that leasing would be allowed in withdrawn areas.

4.2.6.3.2.3. Resource Uses

There are very few resource uses that would adversely impact phosphate resource development. Management for locatable minerals has an undefined adverse impact on the availability of phosphate resources for exploration and development. The number of valid mining claims that encumber lands with phosphate potential is not known and frequently changes. However, because of the occurrence potential for locatable minerals which has little if any tie to the Phosphoria Formation, there is little coincidence of overlapping claims with phosphate resources.

There are no recreation-related withdrawals or management actions that would impact this program area under Alternative A other than those common to all alternatives.

4.2.6.3.2.4. Special Designations

NWSRS-eligible waterway segments do not intersect areas with phosphate potential, with the exception of a few tens of acres along Baldwin Creek that already carry NSO stipulations. Impacts to phosphate development from WSR management under Alternative A would be low to none.

Under Alternative A, designation of ACECs does not specifically close areas to phosphate development. However, because of the extremely high coincidence of ACECs with lands carrying phosphate potential, and the NSO management for ACECs with phosphate potential, most land with phosphate potential in the planning area is unavailable for surface exploration or surface mining.

4.2.6.3.3. Alternative B

4.2.6.3.3.1. Program Management

Alternative B would result in the most adverse impacts to phosphate development of all of the alternatives. Under Alternative B, 39,592 acres of surface estate are specifically closed to phosphate development in areas of phosphate potential. This is equal to 94 percent of the phosphate potential in the planning area.

4.2.6.3.3.2. Resources

Alternative B includes the same protection of the Red Canyon NNL as Alternative A, so the adverse impacts to solid mineral leasing are the same from this resource.

Soil protections under Alternative B include substantially more acres than Alternative A. Unless phosphate mining would take place entirely underground with no or minimal need for surface occupancy, most of the phosphate potential along the Wind River Range front would not be available to phosphate development due to the 15 percent slope restriction alone, because almost the entire dip slope along the Wind River Range front exceeds 15 percent. In addition, approximately 60 percent of the phosphate potential at Sheep Mountain and Conant Creek anticlines is effectively closed to surface activity under Alternative B due to slope restrictions, rather than 10 percent under Alternative A. Under Alternative B, all the Dubois area north of the WRIR with phosphate potential have NSO stipulations because of slope restrictions. Impacts from management in the Dubois area would differ little from those under Alternative A, because it is not likely that Alternative A would allow surface mining due to resource conflicts.

Alternative B manages the Little Red Creek Complex for wilderness characteristics and closes it to solid mineral leasing, which would result in more adverse impacts than Alternative A, which has no such limits. However, it is likely that under Alternative A the BLM would not authorize leases in the Little Red Creek Complex because of its proximity and overlap with the Whiskey Mountain ACEC.

Alternative B protections for riparian-wetland areas, while more stringent than Alternative A protections, would result in only slightly more adverse impacts because there is only a small increase in acreage compared to the total amount of phosphate potential away from riparian-wetland areas.

Wildlife management under Alternative B would result in more adverse impacts to solid mineral leasing than Alternative A because Alternative B limits development of roads in crucial winter range or parturition areas. However, this impact would be wholly contained in areas managed under Alternative B as special designations and closed to solid mineral leasing.

Heritage/cultural concerns in areas with phosphate potential under Alternative B include increased closure acreage in Warm Springs Canyon (totaling 834 acres), which would result in greater adverse impacts to the small amount of phosphate potential compared to Alternative A, which includes only 577 acres of withdrawal.

4.2.6.3.3.3. Resource Uses

Restrictions to phosphate development in areas of travel management are discussed above in relation to the resource values driving travel management decisions.

4.2.6.3.3.4. Special Designations

Although Alternative B manages more NWSRS-eligible waterway segments as suitable for inclusion in the NWSRS than Alternative A, this difference is not substantial because all of the segments managed under Alternative B are in areas closed to solid mineral leasing through ACEC management.

Under Alternative B, ACEC management would result in substantially more adverse impacts to solid mineral leasing from closures in ACECs and NSO areas. The exact acreage that intersect phosphate potential is not calculated, but there would be substantially more adverse impacts to phosphate availability under Alternative B than under Alternative A. The adverse impacts in the Lander Slope, Red Canyon, and Whiskey Mountain areas would be similar to that of Alternative A because these ACECs remain the same in acreage. However, adverse impacts in the East Fork area would likely increase because more acreage would be unavailable under Alternative B. The biggest difference would be in the NHT and the greater sage-grouse ACECs, where there would be adverse impacts to a substantially larger area of phosphate potential because of the expansion of these ACECs under Alternative B. The 16-fold increase in acreage would likely adversely impact phosphate development proportionally in the area of phosphate potential from Schoettlin Mountain south to the planning area boundary.

4.2.6.3.4. Alternative C

4.2.6.3.4.1. Program Management

Alternative C would result in the fewest adverse impacts to phosphate development in the planning area of all the alternatives. Under Alternative C, only 1,721 acres of surface estate and 2,300 acres of subsurface mineral estate are specifically closed to phosphate development in areas of phosphate potential. This results in almost the entire area of phosphate potential in the planning area being open to phosphate development activities.

4.2.6.3.4.2. Resources

Soil and riparian-wetland area protections under Alternative C are the same as under Alternative A, which is less adverse to solid mineral leasing than Alternative B. These prohibitions (due mostly to slope restrictions) would be exercised only on the flanks of stream canyons along the Wind River Range front and would result in little adverse impact, including in the Sheep Mountain or Conant Creek anticlines.

Adverse impacts to phosphate availability would be reduced under Alternative C compared to Alternative B, which closes most of the resource along the Wind River Range. The remaining restrictions due to wildlife concerns that could impact phosphate availability would not affect areas with phosphate potential, except for approximately 300 acres in various scattered places in the planning area.

There would be no impacts due to heritage/cultural concerns in areas with phosphate potential under Alternative C, a less adverse impact to phosphate development than Alternative A or Alternative B because the potential number of acres under Alternative C is very small (approximately 577 acres in the Warm Springs Canyon near Dubois).

4.2.6.3.4.3. Resource Uses

Under Alternative C, there would be no impacts to phosphate resources from recreation management because restrictions due to recreation protections would not intersect phosphate resources. There would be no impacts to phosphate availability from trails and travel management, because areas closed to motorized travel and with seasonal travel limitations would not coincide with areas of phosphate potential.

4.2.6.3.4.4. Special Designations

Under Alternative C, no NWSRS-eligible waterway segments would be recommended for inclusion in the NWSRS. Therefore, adverse impacts to phosphate availability, while small in these areas under any alternative, would be the smallest under Alternative C.

Alternative C does not contain any ACEC designations, which would result in a substantial beneficial impact to the availability of phosphate resources compared to Alternative B, effectively opening most of the highest-quality phosphate resources along the Wind River Range front.

4.2.6.3.5. Alternative D

4.2.6.3.5.1. Program Management

Alternative D would result in the second most adverse impacts to phosphate development in the planning area of all the alternatives. Though the closed acreage is much greater under Alternative B, the affected phosphate resources are almost the same because of where specifically the closures occur under alternatives D and B. Under Alternative D, 36,724 acres of surface estate and 49,773 acres of subsurface mineral estate are specifically closed to phosphate development in areas of phosphate potential. All of the available phosphate resource in the Dubois area is closed under Alternative D. In addition, the entire Lander Slope is closed under Alternative D. This leaves the Conant Creek anticline still open to phosphate exploration and leasing under Alternative D.

4.2.6.3.5.2. Resources

Under Alternative D, management to protect soils would result in about the same adverse impacts as alternatives A and C, with slightly more adverse impacts to soils with slopes between 15 and 24 percent, where conditions over and above standard stipulations could be applied. These restrictions could require more mitigation or relocation of facilities, but would not necessarily preclude solid minerals leasing. Alternative D would result in substantially fewer adverse impacts than Alternative B because Alternative D opens 970,608 more acres to solid mineral leasing, or 40 percent more of the planning area.

Management under alternatives D and B would result in the same adverse impacts to solid mineral leasing from protections of sole-source aquifers and groundwater recharge areas because surface occupancy is not allowed. Alternatives A and C do not include these protections.

Alternative D would result in the same adverse impacts to solid mineral leasing from water quality protection as Alternative A because floodplains and riparian-wetland areas are closed to surface occupancy. This would result in a moderate adverse impact to solid mineral leasing and would be a greater impact compared to Alternative C, but less than Alternative B because Alternative B extends these protections to a ¼ mile.

Alternative D would result in more adverse impacts to solid mineral leasing from the protection of lands with wilderness characteristics than Alternative C, which manages the Little Red Creek Complex with standard stipulations.

Although Alternative D management for riparian-wetland protection would result in the same adverse impacts to solid mineral leasing as Alternative C within DDAs, no DDA has identified phosphate occurrence potential. Accordingly, the Alternative D closure for riparian-wetland protections would result in the same adverse impacts as management under Alternative A, which would be substantially less adverse than under Alternative B, which closes 125,403 more acres. Alternative C riparian-wetland management would result in the fewest potential adverse impacts to leasable minerals.

In addition to adverse impacts to solid mineral leasing for the protection of wildlife common to all alternatives, Alternative D would result in the same moderate adverse impacts to solid mineral leasing as Alternative A by avoiding roads in big game crucial winter range and parturition areas. This would be less adverse than the more restrictive approach to road building under Alternative B, but moderately more adverse than under Alternative C. Adverse impacts to solid mineral leasing under Alternative D would be substantial in the Dubois area, which Alternative D closes to phosphate leasing for the protection of wildlife, as does Alternative B. Impacts to solid mineral leasing under Alternative D would be somewhat more adverse than under Alternative A and substantially more adverse than under Alternative C, which allows solid mineral leasing with standard stipulations on 40,570 acres with phosphate potential.

Alternative D applies timing restrictions for the protection of spawning fish, but would not adversely impact solid mineral leasing. Therefore, Alternative D would not result in more adverse impacts than Alternative C, which applies no seasonal restrictions.

Although Alternative D includes the fewest restrictions on the use of chemical vegetation treatments in sensitive plant populations, this would not impact solid mineral leasing because leasing in areas with those plants would not be allowed under any alternative.

Alternative D management for protection of greater sage-grouse would result in fewer adverse impacts to solid mineral leasing than Alternative B, but substantially more than alternatives A and C. Alternatives B and D close the area within 0.6 mile of leks to surface disturbance, including surface mining of leasable minerals; alternatives A and C close 16,283 acres. Regarding the amount of surface disturbance allowed both inside and outside the greater sage-grouse Core Area, impacts to solid mineral development under Alternative D would be substantially less adverse than under Alternative B. Alternative B limits all disturbance, including solid mineral leasing, while Alternative D disturbance limits do not apply to solid mineral leasing, rangeland improvement projects, or other ROW and are limited geographically to the Core Area. Outside the Core Area, Alternative D only restricts surface disturbance with ¼ mile of leks. This reduces the areas protected from surface disturbance outside the Core Area to 1,962 acres, 25 percent of the total under Alternative B. Approximately 29,531 acres of phosphate potential in the planning area are in the Core Area. Alternative D also places fewer restrictions on the height of objects in the Core Area.

Alternative D management of reptile habitat would be slightly more adverse to solid mineral leasing than Alternative A or Alternative C, and substantially less adverse than Alternative B. Areas with phosphate occurrence potential have not been mapped for reptile habitat.

Alternative D management to protect the cultural resources in the Warm Springs Flume Site has the same adverse impacts to solid mineral leasing as Alternative B and fewer adverse impacts than alternatives A and C. Solid mineral potential is believed to be low, so there is little difference among the alternatives.

VRM could adversely impact solid mineral leasing on a site-specific basis. Alternative D manages 40,650 acres with phosphate occurrence potential that have VRM Classes I or II, which would make it unlikely that surface mining would be allowed. This is similar to the impact under Alternative B and slightly more adverse than the impact under Alternative A. All alternatives would result in substantially more adverse impacts than Alternative C, which manages 1,590,758 acres with phosphate potential with VRM Class IV.

4.2.6.3.5.3. Resource Uses

Differences in management of resource uses across the other alternatives appear to result in no difference in impact as compared to Alternative D because phosphate resources are not generally involved. For example, although Alternative D closes more acreage for recreation/interpretive sites common to all alternatives (same as Alternative B), these sites are not identified as having phosphate potential and this would be an adverse impact. Alternative D withdrawal of the Johnny Behind the Rock area would have the effect of closing the area to solid mineral leasing, but because there is no identified phosphate potential, there would be no adverse impact to solid minerals program.

4.2.6.3.5.4. Special Designations

The Heritage Tourism and Recreation Corridor closes an additional 8,700 acres with phosphate potential. Some of that area is also closed to protect other resource values, such as greater sage-grouse.

Alternative D manages the Baldwin Creek and Sweetwater River NWSRS-eligible waterways as suitable for inclusion in the NWSRS. However, this would result in no additional adverse impacts to the solid mineral program because the eligible segments are in areas closed to solid mineral leasing to protect other values.

Alternative D closes the Dubois area, including Little Red Creek, to solid mineral leasing, which would result in the same adverse impact to identified phosphate resources in the area as Alternative B. Despite high occurrence potential for phosphate resources in the Little Red Creek Complex, it is possible, but unlikely, that under Alternative A the BLM would authorize leasing in this area because of high resource conflicts resulting from the proximity of the Little Red Creek Complex to the Whiskey Mountain ACEC and WSA. In this regard, there would be little difference between alternatives A, B, and D in their adverse impacts to solid mineral leasing compared to Alternative C, which would result in no adverse impacts.

Alternative D management of ACECs and the areas proposed as ACECs under other alternatives would result in more adverse impacts to solid mineral leasing than management under Alternative

A, substantially more than under Alternative C, and less than under Alternative B. Alternative D closes 19,381 acres of phosphate occurrence potential to protect values associated in ACECs.

4.2.7. Salable Minerals

Salable minerals (mineral materials) include sand, gravel, decorative stone such as common granite or moss rock, and other mineral materials not subject to mineral leasing or location under the mining laws. The BLM's principal authority to dispose of such materials is the Materials Act of 1947, as amended (30 U.S.C. 601 et seq.), which applies to sale and free use of the subject materials. The BLM has the most flexibility in managing mineral material disposals of any mineral activity because salable minerals are readily available throughout the planning area and conflict with other resources can generally be avoided while still meeting demand.

4.2.7.1. Summary of Impacts

Alternative B has the most adverse impacts to mineral material disposals because the most lands are closed to disposals. Alternative D has the next greatest impacts in that ACEC and other areas of importance to resources are closed to disposal. Alternative A has the next to the least adverse impacts. It does not specifically close ACECs to mineral materials disposal, but the BLM management approach is to disallow mineral materials developments because of incompatibility with management of other resource values, such as the designation of ACECs. Alternative C which places no restrictions on disposals other than standard stipulations has the fewest adverse impacts particularly with regard to ACECs in comparison to other alternatives. However, under all alternatives, it is anticipated that the demand for mineral material disposals will be satisfied although it may be necessary to transport the materials over a longer distance because more convenient sites are closed, particularly in Alternative B. Transporting mineral materials over longer distances would adversely impact other programs such as health and safety (more accidents), air quality (more vehicle emissions), and wildlife and livestock (more road kills), as well as substantially increasing the delivered cost of the material at the point of use.

Alternative C has the most beneficial impacts to mineral materials by allowing ROWs for roads and utilities in more areas and with fewer restrictions on size, which beneficially impacts access to mineral materials. It has the least restrictive VRM and the fewest protections for wildlife although its management of greater sage-grouse is the same as Alternative A. Alternative A has somewhat fewer beneficial impacts because of ACEC management. Alternative D has less beneficial impacts because resources such as greater sage-grouse, visual resources, and cultural properties are given emphasis in some areas and ACECs are closed to mineral material disposal as well as the Dubois area. Alternative B has the fewest beneficial impacts because so much of the planning area is closed to disposal.

Table 4.20, “Existing and Proposed Areas of Critical Environmental Concern” (p. 670) lists ACEC designations that would adversely impact the availability of mineral materials.

Table 4.20. Existing and Proposed Areas of Critical Environmental Concern

Area of Critical Environmental Concern	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
Lander Slope	25,065	25,065	0	25,065
Red Canyon	15,109	15,109	0	15,109
Dubois Badlands	4,903	4,903	0	0
Whiskey Mountain	8,776	8,776	0	8,776
East Fork	4,431	7,744	0	7,745
Beaver Rim	6,421	20,532	0	6,421
Green Mountain	14,612	24,860	0	21,389
National Historic Trails	27,728	468,183	0	0
South Pass Historic Mining Area [1]	12,576	23,439	0	124,229
Castle Gardens (proposed)	0	8,469	0	0
Cedar Ridge (proposed)	0	7,039	0	0
Government Draw/Upper Sweetwater Sage-Grouse (proposed) [2]	0	1,246,791	0	36,302
Sweetwater Rocks (proposed)	0	152,347	0	0
Continental Divide National Scenic Trail (proposed)	0	259,380	0	0
Regional Historic Trails and Early Highways (proposed)	0	89,016	0	0
Totals	**119,622**	**1,492,990**	**0**	**245,037**

Source: BLM 2009a

[1] Under Alternative D, portions of the National Historic Trails and South Pass Historic Mining Area are designated as the South Pass Historical Landscape ACEC.

[2] Under Alternative D, a portion of the Government Draw/Upper Sweetwater Sage-Grouse area is designated as the Twin Creek ACEC.

ACEC Area of Critical Environmental Concern

4.2.7.2. Methods and Assumptions

This analysis is based on occurrence potential for mineral materials as identified in the Mineral Occurrence and Development Potential Report for the Lander Planning Area (BLM 2009c). “Potential” refers to the potential for or the presence (occurrence) of a concentration of one or more mineral resources. It does not refer to or imply potential for development and/or extraction of the mineral resource(s). It does not imply that the potential concentration is or could be extracted profitably. The mineral potential classification system is based on the level of potential and the level of certainty of data supporting the possible existence of minerals. The level of potential is classified as None (O), Low (L), Moderate (M), High (H), or Not Determined (ND). The level of certainty is classified as A (lowest certainty), B, C, or D (highest certainty).

Implementation of management actions under the alternatives could result in impacts that open, limit, or deny access to and disposal of mineral materials from public lands in the planning area. Adverse impacts to mineral materials disposal could result from management actions that restrict or limit mineral materials disposals, or that place specific stipulations or mitigation requirements on development activity. Conversely, beneficial impacts to mineral materials disposal could result from management that encourages these activities by relaxing stipulations or opening areas to disposal. To the extent that management actions streamline the processing of applications, those actions would result in beneficial impacts, although this is not strictly an environmental impact.

In the planning area, land use decisions generally affect mineral materials disposal less than other non-mineral resources and other resource uses, primarily because of the ubiquitous nature of mineral materials occurrence and the relatively low demand for mineral materials from public lands. Most adverse impacts to mineral materials disposals are short-term (e.g., seasonal restrictions to protect wildlife, seasonal road closures, and delays resulting from the requirement for cultural resource surveys before the BLM issues permits. Long-term impacts include restricting or closing certain areas to mineral materials disposal to protect higher-value resources, or transferring federal mineral estate to private ownership through realty transfers or sales, thereby potentially removing the mineral materials resources from public access.

The BLM has discretionary authority to permit mineral materials disposals. It may choose to approve or disapprove such sales or permits, case by case, in the planning area. In accordance with regulations at 43 CFR 3601.10-11, the BLM will not dispose of mineral materials if it determines that the aggregate damage to public lands and resources would exceed the public benefits the BLM expects from the proposed disposal. Consistent with 43 CFR 3601.12, the BLM also will not dispose of mineral materials from wilderness areas, or other areas expressively prohibited by law, including national parks and monuments. The BLM also will not dispose of mineral materials from areas identified in land use plans as not appropriate for mineral materials disposal.

It is assumed that wherever NSO stipulations apply for oil and gas leases, the area is managed as closed to mineral materials disposals. This management was established in the 1987 RMP and carried forward. In all alternatives, it is assumed that if resource values exist that justify NSO for oil and gas operations, then mineral material disposal would be directed to another location.

Generally, a withdrawal closes lands to the exercise of discretion to dispose of mineral materials only if the Secretary of the Interior intends that result, usually by an express reference in the withdrawals. Case law has established that pre-FLPMA withdrawals or segregations that closed land to the operation of the public land laws, including the mineral leasing laws either expressly or by interpretation, also closed land to the Materials Act. Any other withdrawal or segregation has no impact on the Materials Act. Current BLM policy is to not use FLPMA withdrawals to close land to discretionary action, but to exercise this discretion through land use planning decisions. In any case, it is assumed for purposes of analysis that all mineral withdrawals apply to mineral materials disposals.

In most cases, demand for mineral materials during the planning period will be directly proportional to the rate of other resource development in a given area. Based on data collected for the period 1989 through 2009, mineral materials disposals have averaged 183 acres per year throughout the planning area. This value is likely high because the data from this period include multiple large sales related to Abandoned Mine Land (AML) projects in the Gas Hills that will likely not be repeated. However, for purposes of analysis, it is assumed that the activity related to mineral materials disposals will continue at a similar rate for the next planning cycle because it would be speculative to arbitrarily reduce the activity by some amount, and other types of development (e.g., oil and gas and ROWs) are increasing.

The BLM does not guarantee access through private surface. Where the BLM cannot grant access across the public lands to a mineral materials site due to legal barriers such as ESA restrictions, the purchaser will need to obtain access through non-federal land.

The BLM will not sell soil that is essential for the growth of vegetation at the site of disposal.

There is potential for mineral materials occurrences across the planning area, and the principal mineral material occurrence types will continue to be sand and gravel, limestone, shale, granite, and to a lesser degree, moss rock. As discussed in the Mineral Occurrence and Development Potential Report (BLM 2009c) potential for occurrence and certainty level for these materials throughout the planning area is H/D. Known sand and gravel deposits with a rating of H/D are present particularly along major drainages, glacial deposits, and alluvial basins throughout the planning area (see Figure 3-17 of the Mineral Occurrence and Development Potential Report).

Known common-variety limestone in the Madison Formation or the Chugwater Group (Alcova Limestone) is rated H/D. Such occurrences are present along parts of the perimeter of the planning area.

Known common-variety granite is present over large areas, such as the Dubois area, South Pass, Sweetwater Canyon, Sweetwater Rocks, and Copper Mountain, and in these areas is rated H/D.

There are weathered rocks of sandstone, siltstone, limestone, or granite covered in part with lichens throughout the planning area. Sandstone and siltstone outcrops, primarily in the Flathead, Cloverly, Muddy, Frontier, and Mesaverde formations, are commonly considered to be moss rock if they are partially adorned with colorful lichens. In these formations, the occurrence potential and certainty level for moss rock is H/D. Based on current use at existing moss rock common use areas and negotiated sales sites, the potential for future commercial development of moss rock from federal mineral estate in the planning area is estimated to be high in areas where there are resources and those resources are available for disposal.

4.2.7.3. Detailed Analysis of Alternatives

4.2.7.3.1. Impacts Common to All Alternatives

Restrictions on development of mineral materials could adversely impact exploration and development activities when closures or prohibitions to surface-disturbing activities apply, because the mineral materials could not be accessed. The intensity of impacts would vary by alternative and be proportional to actual demand. It follows that the impacts would be potentially larger when closures or prohibitions fall on areas with high occurrence or potential than in areas of moderate to low occurrence or potential.

Management actions common to all alternatives that would adversely impact mineral materials include continuing to maintain all pre-FLPMA withdrawals and segregations that closed land to operation of the public land laws, including the mineral leasing laws, either expressly or by interpretation (see *Methods and Assumptions*). The *Lands and Realty* section in Chapter 3 lists these areas, and they are not further analyzed because they do not vary by alternative.

Under all alternatives, the requirement for cultural resources and threatened and endangered species consultations would be maintained as these regulatory requirements are outside the realm of RMP decision making.

Under all alternatives, new mineral materials disposals in areas open to mineral materials disposal are subject to site-specific analysis before approval. Approval of mineral materials disposals would require appropriate mitigation and site-specific reclamation based on a current mining and reclamation plan. Mitigation and a site-specific reclamation requirements could prescribe certain activities or mitigation that could reduce the economic viability of mineral materials disposals and result in indirect adverse impacts to mineral materials disposals (e.g., the application of standard mitigation guidelines such as slope restrictions and riparian-wetland setbacks, and timing restrictions to protect for BLM-sensitive wildlife species).

Case law has established that there is no authority for the Secretary to make sales of mineral materials from unpatented mining claims under the provisions of the Surface Management Act of 1955. Therefore, mining claims could adversely impact the availability of mineral materials disposals if the BLM was not successful in contesting the validity of such mining claims by establishing the lack of discovery if a valuable mineral deposit.

Management of WSAs is the same under all alternatives in regards to the management of salable minerals; all WSAs are closed to mineral materials disposal. This would adversely impact mineral materials availability, and some areas, such as Sweetwater Rocks and Sweetwater Canyon, contain large quantities of igneous rock material (primarily granite) that is off limits to disposal. In addition, Copper Mountain includes some rock formations of varying color and texture that could be desirable as decorative stone. These adverse impacts are not further analyzed because they do not vary by alternative.

Mineral materials availability decisions, such as the designation of common use areas, result in beneficial impacts to the availability of mineral materials. All alternatives continue existing common use areas, including the Little Popo Agie, Diamond Springs, and Agate Flats common use areas, which in total designate 262 acres of surface estate available for streamlined “over-the-counter” disposals. There are no community pits identified under any alternative, but it is likely that this would be allowed under all alternatives; no decision under an RMP revision is required for such designations.

4.2.7.3.2. Alternative A

4.2.7.3.2.1. Program Management

Alternative A continues management of resources on BLM-administered surface and subsurface mineral estate in the planning area under the 1987 RMP. Through land use planning decisions, Alternative A only specifically closes areas to mineral materials disposal that are withdrawn from the mining laws under pre-FLPMA or post-FLPMA withdrawal orders (assuming that mineral withdrawals will continue to be maintained), areas closed to oil and gas development (Whiskey Mountain and East Fork), and two areas closed to phosphate development in Red Canyon.

ACECs and other special designations do not necessarily close areas to mineral materials disposal under Alternative A, but management under Alternative A generally specifies that mineral materials disposals are incompatible with the values managed under those special designations, effectively rendering those areas closed to mineral materials disposals.

As discussed under *Methods and Assumptions* and the *Impacts Common to All Alternatives*, withdrawals and segregations might or might not contain express language to close lands to mineral materials disposal, but existing management under Alternative A specifies that mineral materials will be provided “on a demand basis and consistent with the limitations and restrictions imposed on oil and gas, locatable minerals, and phosphate exploration and development in the planning area”, thus effectively closing these areas to mineral materials disposals. Therefore, other than areas under mineral withdrawal or segregation, special designations, or areas specifically closed to leasable minerals (see Table 2.3, “Comparative Summary of Proposed Land

Use Decisions in the Lander Planning Area" (p. 32)), the entire planning area is open to mineral materials disposals case by case consistent with the limitations and restrictions imposed on oil and gas, locatable minerals, and phosphate exploration in the planning area.

Alternative A closes a total of 229,014 acres of surface estate.

4.2.7.3.2.2. Resources

Soil-related adverse impacts to mineral materials disposals include prohibitions in areas where slopes are greater than 25 percent. These areas represent approximately 182,345 acres in the planning area. Alternative A does not address soils with LRP.

Riparian-wetland area restrictions under Alternative A prohibit mineral materials disposals within 500 feet of surface water and riparian-wetland areas. These areas represent 102,361 acres of surface estate.

Wildlife-related impacts under Alternative A include restrictions such as closures, NSOs, and timing and surface-use restrictions. Greater sage-grouse leks are considered NSO on or within a ¼-mile buffer around occupied leks, and under Alternative A would result in closures of 16,283 acres of surface. This would adversely impact mineral materials disposals. In addition, surface-disturbing and surface-disruptive activities are to be avoided in greater sage-grouse nesting habitat within 2 miles of occupied leks from February 1 through July 31. This stipulation would adversely impact the availability of mineral materials from new surface disturbance by constraining activities to only a few months out of the year in these areas, which total 794,452 acres of surface estate. This is an economic and convenience issue for the applicant rather than an adverse impact that closes the areas.

Alternative A greater sage-grouse management increases the likelihood the species would be listed under the ESA because a ¼-mile buffer and a 2-mile buffer area are less than the science recommends, and because other program management that contributed to a downward trend in greater sage-grouse populations is continued. Listing would result in fewer potential impacts to the mineral materials program than to the locatable minerals program because the BLM's ability to control locatable mineral development is more limited even though it must comply with the ESA.

Other protections for special status wildlife and plants under Alternative A could result in delays or timing restrictions case by case, which would adversely affect the availability of mineral materials. Total acres of crucial winter range for all species that carry timing and distance restrictions include 605,898 surface acres (identical across all alternatives). In addition, mineral materials disposals are seasonally avoided in elk winter range (166,525 surface acres and 221,232 acres of mineral estate). Surface-disturbing and disruptive activities related to mineral materials disposals are prohibited within ¾ mile of active raptor nests (301,237 surface acres). Surface-disturbing activities are also avoided in pygmy rabbit habitats and prairie dog colonies, which would adversely impact the disposal of mineral materials.

Management under Alternative A states that mineral materials disposals could also be restricted or prohibited for the protection of important heritage/cultural/historic sites case by case.

4.2.7.3.2.3. Resource Uses

Alternative A does not identify recreation-related withdrawals or segregations other than the pre-FLPMA withdrawals and segregations common to all alternatives.

Restrictions to mineral materials disposals in areas with travel management are discussed n relation to the resource values driving the travel management decisions.

4.2.7.3.2.4. Special Designations

Interim management for NWSRS-eligible waterway segments under Alternative A would protect free-flowing characteristics, but would not result in adverse impacts to mineral materials disposals in and of themselves because they are subject to other management to protect various resources. These areas do have mineral materials potential, including large quantities of granitic rock for decorative or aggregate use in Sweetwater Canyon, but this area is within a WSA and is managed according to the WSA IMP.

Special designations such as ACECs, WSAs, and Congressionally Designated Trails, adversely impact the availability of mineral materials. Consistent with 43 CFR 3601.10-11, under Alternative A, these areas, while not expressively closed to mineral materials disposals, are managed to effectively prohibit mineral materials disposals where such disposals would be inconsistent with the values the special designations are designed to protect. Under Alternative A, 119,622 acres are under ACEC management and therefore effectively unavailable for mineral materials disposal (see Table 4.20, “Existing and Proposed Areas of Critical Environmental Concern” (p. 670)).

4.2.7.3.3. Alternative B

4.2.7.3.3.1. Program Management

Alternative B emphasizes conservation of physical, biological, heritage, and visual resources, with constraints on resource uses. Compared to other alternatives, Alternative B conserves the most land area for physical, biological, and heritage resources; designates the most ACECs; and is the most restrictive to motorized travel and mineral development. Management actions for resources that restrict, prohibit, or limit mineral materials disposals would result in adverse impacts by preventing or substantially restricting development in these areas. Under Alternative B, adverse impacts to mineral materials would generally be much larger than under alternatives A and C.

Closure of public lands to mineral materials disposals would results in impacts similar to those under Alternative A, although to a greater degree because more land is closed, and more land is specifically closed when included under a special designation (e.g., ACEC, WSA, Congressionally Designated Trails, or WSR). Alternative B represents the greatest adverse impact to the mineral materials program due to mineral estate closures totaling 2,208,943 acres, the most of any alternative. Sufficient area remains open to mineral materials disposals under Alternative B to meet demand, but applicants might need to travel long distances at greater expense to obtain the materials.

4.2.7.3.3.2. Resources

Soil-related restrictions under Alternative B are greater than under Alternative A. Alternative B closes 413,670 acres to mineral materials disposals, more than twice the 182,345 acres under Alternative A. In addition, Alternative B closes 86,735 surface acres in areas with LRP soils; Alternative A avoids, but does not close, areas with LRP soils. It is not likely that the BLM would allow mineral materials disposals in some of the areas closed under Alternative B but open under

Alternative A out of concern for impacts to other resources, but that would be addressed in site-specific analyses.

Riparian-wetland area restrictions under Alternative B prohibit mineral materials disposals within 1,320 feet of surface water and riparian-wetland areas totaling 227,764 acres of surface estate in the planning area. Alternative A only requires 500-foot setbacks. Therefore, acres of available surface estate that would be adversely impacted for mineral materials disposals would approximately double under Alternative B compared to Alternative A.

Wildlife-related impacts to mineral materials availability are largest under Alternative B and include restrictions such as closures, NSOs, and timing and surface-use restrictions. Adverse impacts to mineral materials disposals due to greater sage-grouse concerns increase in acreage under Alternative B because the buffer of NSO is increased to 0.6 mile around occupied leks, resulting in closures of 93,410 acres of surface estate (a minor increase over Alternative A).

Under Alternative B, other protections for special status wildlife and plants could result in delays or timing restrictions case by case. This would increase applicant costs and therefore have some impact on the applicant or decrease the likelihood for some operators to pursue development, but would not preclude the mineral materials disposals at the same time of the year.

Restrictions due to raptor concerns under Alternative B would result in the largest impacts to mineral materials disposals because buffers around active raptor nests would be twice the size of those under Alternative A (1.5 miles versus ¾ mile). Therefore, surface-disturbing and disruptive activities related to mineral materials disposals under Alternative B are subject to timing stipulations on 781,643 surface acres, which is more than twice as restrictive as Alternative A. Alternative B also avoids surface-disturbing activities in pygmy rabbit habitats and prairie dog colonies, which would adversely impact mineral materials disposals.

Mineral materials disposals under Alternative B could be restricted or prohibited for the protection of important heritage/cultural/historic sites case by case. Under Alternative B, more acres of surface estate would be unavailable for mineral materials disposals due to heritage/cultural/historic sites compared to Alternative A. This would result in greater adverse impacts to mineral material availability.

4.2.7.3.3.3. Resource Uses

Alternative B would result in the most adverse impacts to the availability of mineral materials from resource uses compared to the other alternatives.

Under Alternative B, recreation management emphasizes protection of resources and recreational experiences, and includes more restrictions on resource uses than the other alternatives. Under Alternative B, a total of 2,208,943 surface acres are closed to mineral materials disposal. Alternative B adversely impact mineral materials disposals approximately nine times more than Alternative A.

Recreation-related withdrawals or segregations under Alternative B that apply to mineral materials disposal (based on presumed intent of the withdrawal/segregation order) apply to 169,774 acres (see Table 4.15, “Acreage of Withdrawals for the Benefit of Habitat, Cultural or Recreational Values” (p. 624) in the *Locatable Minerals* section) more than the acres common to all alternatives, which is the most of any alternative. The increase of closed acreage under Alternative B is due partially to the addition of interpretive sites such as Castle Gardens; and NHT sites such Devil's Gate, Martin's Cove, and Split Rock Rest; RMZs such as The Bus @ Baldwin Creek and Sinks Canyon; and SRMAs such as the Dubois Mill Site and Sweetwater Rocks.

Expanded recreation management under Alternative B, such as the designation of additional SRMAs, would increase adverse impacts to the availability of mineral materials compared to Alternative A. The three SRMAs under existing management (Alternative A) are not specially managed to preclude mineral materials disposals. Under Alternative B, seven SRMAs are designated and carry NSO restrictions that effectively close 307,183 acres in these areas and therefore would result in more adverse impacts to mineral materials availability.

Alternative B also designates seven RMZs within the SRMAs. These are zones where management is more finely tuned toward a specific outcome. Because these RMZs are within the SRMAs, they do not represent impacts to mineral materials availability additional to the impacts from management under the SRMAs. Neither Alternative A nor C designates RMZs.

Under Alternative B, 13 Extensive Recreation Management Areas (ERMAs) are designated to address local recreation issues (in addition to general Lander ERMA that does not address specific management). These areas total 801,776 acres that would impact the availability of mineral materials; management in these areas would avoid mineral materials development because it would be incompatible with recreation management objectives.

Alternative B has the far more adverse impacts to mineral materials disposals because of travel management limitations in comparison to Alternative A.

4.2.7.3.3.4. Special Designations

Alternative B manages mineral actions within 5 miles of each side of NHTs with NSOs and stronger restrictions (i.e., closed to mineral materials disposals) unless the proposed project would not be visible from the NHTs. This would result in substantially larger adverse impacts to mineral materials availability than management under Alternative A, which requires closures to mineral materials disposals within ¼ mile of the NHTs. Alternative B would be particularly more adverse because it precludes disposals in areas that have historically been in high demand. In addition, mineral materials disposals are prohibited 45,394 along the CDNST (in the Sweetwater Mining RMZ) under Alternative B. There is no similar action under Alternative A.

Under Alternative B, the BLM closes all 8 WSAs to motorized and mechanized travel, which, considering the need for motorized equipment to mine and transport mineral materials, would effectively result in closures to mineral materials disposals. This would not result in more adverse impacts than Alternative A, because the acreage and management are the same under alternatives A and B.

The retention and expansion of existing ACECs and the addition of several new ACECs under Alternative B would result in more adverse impacts to mineral materials disposals than Alternative A. Alternative B includes 15 ACECs − nine existing areas (five of which the BLM proposes to expand) and six new ACECs (see Table 4.20, "Existing and Proposed Areas of Critical Environmental Concern" (p. 670)). Management in ACECs would preclude mineral materials disposals. Under Alternative B, total acreage in ACECs is 1,492,990, more than the 119,622 acres in ACECs under Alternative A.

Alternative B WSR management would adversely impact mineral material disposal more severely than Alternative A because all eligible waterways would be closed to disposals.

4.2.7.3.4. Alternative C

4.2.7.3.4.1. Program Management

Alternative C emphasizes resource uses and reduces constraints on resource uses to protect physical, biological, heritage, and visual resources. Compared to other alternatives, Alternative C conserves the least land area for physical, biological, and heritage resources and is the least restrictive to motorized vehicle use and mineral development. Under Alternative C, closures would adversely impact 141,409 acres of surface estate, substantially less than under Alternative B, which closes 2,208,943 acres of surface estate to mineral materials disposals. Alternative C closes approximately half the acreage of Alternative A.

4.2.7.3.4.2. Resources

Alternative C management actions for resources such as soil, riparian-wetland areas, and wildlife that restrict, prohibit, or limit mineral materials disposals would result in adverse impacts by preventing or substantially restricting development. Under Alternative C, adverse impacts to mineral materials availability would be slightly less than under Alternative A and much less than under Alternative B.

Alternative C protections for riparian-wetland areas would adversely impact mineral materials availability less than Alternative B because of the difference in riparian-wetland setbacks. Alternative C riparian-wetland setbacks are the same as Alternative A, unless less distance would protect the riparian-wetland area.

Wildlife-related impacts to mineral material availability would be much less under Alternative C than under Alternative B and Alternative C would have similar impacts compared to Alternative A. Similar to the other alternatives, Alternative C avoids surface-disturbing activities in pygmy rabbit habitats and prairie dog colonies, which would adversely impact the availability of mineral materials since it would diminish the likelihood that management would approve a disposal in those habitats. This acreage would be determined on a site-specific project basis.

Mineral materials disposals under Alternative C could be restricted or prohibited for the protection of important heritage/cultural/historic sites case by case, but no new areas are identified other than the ones common to all alternatives. This would result in fewer adverse impacts to mineral materials disposals than Alternative B, and similar to but fewer than Alternative A.

4.2.7.3.4.3. Resource Uses

Alternative C would result in the fewest adverse impacts to the availability of mineral materials from resource uses compared to alternatives A and B.

Protections for recreation-related resource uses under Alternative C result in a total 59,992 acres of surface estate with NSO or stricter management, which would close these areas to mineral materials disposals. This is less adverse to mineral resources than either Alternative A or B. Recreation management under Alternative C includes the designation of only one SRMA.

Alternative C designates only one ERMA, with no restrictions on mineral materials disposal, which would results in a far smaller adverse impact than Alternative B which has recreation management that limits disposal.

Alternative C has the fewest adverse impacts on mineral materials disposals as a result of travel management limitations.

4.2.7.3.4.4. Special Designations

Under Alternative C, adverse impacts to mineral materials availability would be substantially fewer than the other alternatives, particularly Alternative B.

Alternative C manages the entire CDNST as an ERMA and designates ¼ mile on either side of the trail as an NLCS landscape (both of which generally result in a goal of avoiding incompatible activities), while Alternative B closes 5 miles on either side along most of the CDNST. Under Alternative A, the entire CDNST is included in an SRMA, but there are no allowable use decisions for the area. Therefore, regarding the CDNST, Alternative A would result in the smallest impact to mineral materials availability.

As under Alternative A, Alternative C manages mineral and realty actions within ¼ mile of each side of the NHTs as closed to mineral materials disposals which is far less adverse than Alternative B's 5-mile buffer. A large portion of this area is included in the greater sage-grouse ACEC under Alternative B.

Alternative C does not recommend any of the nine NWSRS-eligible waterways as suitable for inclusion in the NWSRS.

Alternative C does not designate any ACECs, as opposed to the eight ACECs under Alternative A and the new and expanded ACECs under Alternative B.

4.2.7.3.5. Alternative D

4.2.7.3.5.1. Program Management

Alternative D emphasizes a mixture of resource uses and protections of physical, biological, heritage, and visual resources. Although far less restrictive of mineral material disposals than Alternative B, all 245,037 acres of ACECs are closed to disposals along with greater sage-grouse Core Area and the Dubois area. In total, 1,249,626 acres are closed to disposals which is the second largest closure of the alternatives; 1,559,475 acres are available for disposal subject to a site-specific analysis.

4.2.7.3.5.2. Resources

Alternative D management to protect soils would result in the same adverse impacts as alternatives A and C, with slightly more adverse impacts in soils with slopes between 15 and 24 percent, where conditions over and above standard stipulations could be applied. These restrictions could require more mitigation or relocation of facilities, but will not preclude mineral materials disposals. Alternative D would result in substantially fewer adverse impacts than Alternative B because Alternative D opens 1,191,669 more acres to mineral materials disposals than Alternative B. In any case, the prevalence of mineral material occurrences should mitigate most adverse impacts to mineral materials disposals from slope restrictions.

Under Alternative D, adverse impacts to mineral materials disposals from protections of sole-source aquifers and groundwater recharge areas would be the same as under Alternative B, and less than under Alternative C because surface occupancy is not allowed under Alternative C. Although Alternative A does not prohibit disposals in groundwater resource areas, disposals would likely be denied on a site-specific basis because of the extremely flexible management the BLM uses to manage mineral materials.

Alternative D would result in the same adverse impacts to mineral materials disposals from management to protect water quality as Alternative A because floodplains and riparian-wetland areas are closed to surface occupancy. This could represent a substantial adverse impact to sand and gravel disposals because floodplains and riparian-wetland areas usually have prime occurrence potential for materials of this type. Floodplain and riparian-wetland management under Alternative D would result in very small adverse impacts to other types of mineral materials. In general, however, management under Alternative D for these resources would result in more adverse impacts to mineral materials disposals than management under Alternative C, but fewer than management under Alternative B. See Chapter 2 for a comparison of the areas closed to mineral materials disposals under each alternative.

Alternative D management to protect lands with wilderness characteristics would result in more adverse impacts to mineral materials disposals than Alternative C. Alternative D closes the Dubois area, including the Little Red Creek Complex, to mineral materials disposals, which would result in the same adverse impacts as Alternative B. Under Alternative A it is unlikely that the BLM would authorize mineral materials disposals in the Little Red Creek Complex because of its proximity to the Whiskey Mountain ACEC and WSA and the high resource conflict. With respect to these resources, there is little difference among alternatives A, B, and D in their potential adverse impacts to mineral materials disposals compared to Alternative C, which would not result in adverse impacts because disposals are allowed. In any case, the demand for such disposals in the Little Red Creek Complex is low.

In addition to the adverse impacts to mineral materials disposals from the protection of wildlife common to all alternatives, Alternative D would result in the same moderate adverse impacts to mineral materials disposals as Alternative A by avoiding roads in big game crucial winter range and parturition areas. This management limits the areas available for disposals and could limit demand for mineral materials. This would be less adverse than the Alternative B more restrictive approach to road building, but moderately more adverse than Alternative C.

Alternative D applies timing restrictions for the protection of spawning fish, but this would not adversely impact mineral materials disposals. Therefore, Alternative D would not result in more adverse impacts than Alternative C, which applies no seasonal restrictions.

Although Alternative D imposes the fewest restrictions on the use of chemical vegetation treatments in sensitive plant populations, this would not beneficially impact mineral materials disposals because surface mining in areas with such plants would not be allowed under any alternative.

Alternative D management for protection of greater sage-grouse would result in fewer adverse impacts to mineral materials disposals than Alternative B, but many more than alternatives A and C. Alternatives B and D close the area within 0.6 mile of leks to surface disturbance, including surface mining of leasable minerals; alternatives A and C close 16,283 acres. Alternative D would be substantially less adverse than Alternative B in the amount of surface disturbance allowed both inside and outside greater sage-grouse Core Area because Alternative B applies limits to all disturbance, including mineral materials disposals. However, disturbance limits under Alternative D do not apply to mineral materials disposals, rangeland improvement projects, or other ROWs and are limited geographically to the Core Area. Outside the Core Area, Alternative D restricts surface disturbance to within ¼ mile of leks. This reduces the areas protected from surface disturbance outside the Core Area in comparison to Alternative B. Alternative D also places fewer restrictions on the height of objects in the Core Area.

Alternative D management of reptile habitat would be slightly more adverse to mineral materials disposals than Alternative A or C, and much less adverse than Alternative B. Mineral material potential has not been mapped for reptile habitat.

Adverse impacts to mineral materials disposals under Alternative D would be substantial in the Dubois area, which is closed to mineral materials disposal for the protection of wildlife, as is the case for management under Alternative B. This would be somewhat more adverse than Alternative A and much more adverse than Alternative C, which allows mineral materials disposals with standard stipulations on 185,266 acres. The current demand for mineral materials in the Dubois area is not well known and has been generally limited to sand and gravel in several designated pits in the Overlook area.

Management under Alternative D to protect cultural resources in the Warm Springs Flume Site would adversely impact mineral materials disposals by closing those portions not already closed under an existing mineral withdrawal, which is the same as management under Alternative B. This impact would be more adverse than Alternative A and substantially more adverse than Alternative C. The flume site is within the area already closed under Alternative D for the protection of wildlife discussed in the preceding paragraph.

Cultural resource management of Cedar Ridge and Castle Gardens TCPs and the Regional Historic Trails and Early Highways (RHT&ETs) are analyzed under *Special Designations*.

VRM could adversely impact mineral materials disposals on a site-specific basis. Alternative D manages 25 percent more of the planning area than Alternative A as VRM Classes I and II, which would make it unlikely that mineral materials disposals would be allowed unless visual intrusions could be mitigated by terrain. However, only a portion of this acreage has potential for mineral materials. This would result in impacts similar to Alternative B and slightly more than Alternative A. All alternatives would result in more adverse impacts than Alternative C, which manages more acreage as VRM Class IV. Depending on site-specific situations, mineral materials disposals could be authorized in VRM Class II and III areas if analysis in accordance with BLM guidance determined that the contrast would be acceptable. It is not possible to quantify the differences in adverse impacts to mineral materials disposals among alternatives.

4.2.7.3.5.3. Resource Uses

Alternative D specifically closes acreage related to recreation/interpretive sites in addition to closures common to all alternatives (the same as Alternative B). However, it is likely that this adverse impact to mineral materials disposals would also be the same as under alternatives A and C because the BLM would likely deny a disposal in these areas because of the traditional recreation-related use of the areas. Although Alternative C emphasizes resource uses, there are so many other sources for materials that the BLM would likely deny disposals in developed interpretive sites.

4.2.7.3.5.4. Special Designations

Management under Alternative D to protect values associated with Congressionally Designated Trails would more adversely impact mineral materials disposals than alternatives A and C, but less than Alternative B. Additionally, other resource values in the Heritage Tourism and Recreation Corridor contribute to more restrictions in the corridor.

Alternative D manages the Baldwin Creek and Sweetwater River segments as eligible and suitable for inclusion in the NWSRS; however, this would result in no additional adverse impacts to the mineral materials program because these segments are in areas otherwise closed to disposals to protect other values.

Alternative D management of ACECs and of the areas proposed as ACECs in the other alternatives (but not carried forward in Alternative D) would result in more adverse impacts to mineral materials disposals than management under Alternative A, substantially more than under Alternative C, and less than under Alternative B. See Chapter 2 for acres closed to mineral materials disposals under each alternative. The primary difference between Alternative B and Alternative D regarding adverse impacts to mineral materials disposals is that, while all of the Greater Sage-Grouse Reference and Education Area (including the Twin Creek ACEC) is closed to mineral materials disposals under both alternatives, much of the proposed Government Draw/Upper Sweetwater ACEC is closed to mineral materials disposals under Alternative B but is open under Alternative D. The closures in the Government Draw/Upper Sweetwater ACEC are not included in management under Alternative D because mineral materials disposals are not subject to the surface disturbance limitations applied to oil and gas leasing and energy projects.

4.3. Fire and Fuels Management

This section describes potential impacts to fire and fuels management from management actions for other resource programs. Restrictions on fire and fuels management are considered direct impacts. Indirect impacts from alternatives include actions resulting in a change in risk or incidence of wildland fires; size, intensity, or destructive nature of wildland fires; fire-suppression costs; and fuel loading.

Fire plays an important and natural part in ecosystem function; however, a number of factors have altered the natural fire regime in the planning area. Although alteration of the natural fire regime is considered an adverse impact to fire ecology, actions contributing to an increase in the incidence of wildland fires or limiting the ability to effectively fight wildland fires are considered adverse impacts to fire management. This analysis focuses on impacts to fire management. For example, actions limiting fire-suppression tactics, thereby resulting in larger burn areas or more intense fires, are considered adverse impacts. Conversely, actions contributing to a decrease in the incidence of resource-damaging wildland fires or enhancing the ability to fight fires are considered beneficial impacts. For example, the use of unlimited tactics or full suppression may, in some cases, protect a resource against potential fire damage, a beneficial impact.

Regarding planned (prescribed) fire and fuels management, actions restricting the acreage or effectiveness of prescribed fire and fuels treatments are considered adverse. For example, stipulations to protect other resources (e.g., wildlife or livestock grazing) that restrict or prevent prescribed fires and fuels treatments in certain areas or at certain times of the year are considered direct adverse impacts to prescribed fire and fuels management. Conversely, the absence of stipulations or actions that may increase the acreage or effectiveness of prescribed fire and fuels management are considered beneficial impacts. This may also be true for stipulations or actions that support the suppression tactics that allow the use of wildland fire for resource benefit.

For purposes of this analysis, short-term impacts to fire and fuels management include impacts occurring within 5 years. Long-term impacts remain or occur after 5 years. The BLM anticipates short- and long-term impacts to fire and fuels from management under all alternatives.

The following description of impacts is organized into three sections: wildfires (unplanned ignitions); prescribed fire (planned ignitions) and fuels management that are utilized to achieve resource benefits, and stabilization and rehabilitation following fire. Analysis methods and assumptions described in the *Unplanned/Wildfire* section apply to all three sections.

Summary of Impacts

Alternative B would result in the most adverse impacts to wildfire suppression because this alternative has the most limitations on the use of the full suite of suppression actions; Alternative C would result in the most beneficial impacts to wildfire suppression. Alternatives A and D are more restrictive than Alternative C, but provide similar flexibility to suppress wildfire while minimizing damage to resources. Alternative D would result in approximately the same impacts as Alternative A, with potentially a slightly greater degree of flexibility in the use of prescribed fire/wildland fire that is utilized to achieve resource benefits and fuels management. Alternative B provides for the greatest opportunity to allow fire to return to its natural role in the ecosystem, utilize fuels treatments to protect Wildland Urban Interface (WUI) areas, and restore ecosystems. Alternative B would have a beneficial impact to the fire program by emphasizing fire and fuels treatments as rangeland improvement projects as opposed to building livestock grazing infrastructure such as fences and water developments. Not only would fire risk be reduced with additional treatments, but not expanding range infrastructure would decrease the need for suppression efforts and increase the BLM's ability to allow for fire to fulfill its natural role in the ecosystem.

4.3.1. Unplanned/Wildfire

4.3.1.1. Summary of Impacts

Wildfire management within the planning area is a cooperative program with adjacent federal and state agencies as well as the local fire departments. Stipulations for resource management programs that prohibit management decisions to successfully contain an undesired wildfire are considered adverse impacts. Management decisions that increase development and activity in high fuel load areas within the planning area may lead to an increase in undesired human-caused fires and would be considered an adverse impact. Allowances from other resource management programs that allow certain wildfire management decisions are considered beneficial impacts. Such is the case with the use of wildland fire for resource benefit (fire use).

4.3.1.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the followings (these methods and assumptions also apply to the analysis presented in the Stabilization and Rehabilitation section):

- There is a direct relationship between fuel loads (standing and non-standing vegetation) and potential fire size and intensity. Higher fuel-loading levels increase the size and intensity of fires.

- The area specific fire management plan (Southern Wyoming Zone Fire Management Plan [FMP] [BLM 2004b]) implements the fire and fuels management direction on BLM-administered lands in the planning area.
- Wildland fires that do not threaten human life, private properties, or important resources can be used as a tool to reduce fuel loads, improve plant communities, and enhance wildlife habitats. The types of tools available for wildland fire management, including the use of wildland fire to accomplish specific resource management objectives, are described in more detail in the Southern Wyoming Zone FMP.
- Development of infrastructure such as for oil and gas or wind-energy development limit or close areas to use of fire as a vegetation treatment tool.
- Compared to limited suppression tactics, unlimited tactics reduce the amount of acres burned annually, but potentially increase the amount of surface disturbance and result in the need for more extensive rehabilitation. Unlimited suppression tactics also alter the condition class of the vegetation by preventing wildland fire to play its appropriate role in maintaining fire-adapted ecosystems.
- The increasing presence of invasive plant species and cheatgrass in the planning area can change fire behavior, alter the natural fire regime, result in poor reestablishment of native species post-burn, and restrict future fuels treatment options.
- The BLM Emergency Stabilization and Rehabilitation standards in the DOI Interagency Burned Area Emergency Response Guidebook (DOI 2006b) and the BLM Burned Area Emergency Stabilization and Rehabilitation Handbook (BLM 2007d) could be implemented for wildland fires to protect and sustain healthy ecosystems and protect life and property.
- In cases where human life or safety may be at risk, full fire-suppression tactics would be used and would become a higher priority than any resource protection or management stipulations.

4.3.1.3. Detailed Analysis of Alternatives

All alternatives would impact wildfire suppression and management, and wildfire suppression and management could impact other resources, including resource protection. For example, fires burning more acreage for longer periods emit more particulate matter into the air, thereby affecting air quality. In addition, fire can affect rangeland health, wildlife habitat quality and quantity, and plant community health. Impacts to other resources (e.g., physical and biological resources) from fire management are addressed under the appropriate resource section.

4.3.1.3.1. Impacts Common to All Alternatives

The use of wildland fire as a management tool in forests and woodlands facilitates the reintroduction of fire to its natural role in the ecosystem and may help to restore aspen stands that depend on fire. In light of depressed demand and oversupply of wood products, forest and woodlands management is not expected to substantially contribute to future wildfire management under any alternative.

Lands and realty actions may result in adverse impacts to wildfire management because some areas with mixed ownership patterns not identified for disposal are very difficult to access and provide challenges for suppression actions. These areas may also have a higher potential for fire due to increased human activity associated with WUI areas. Notable examples are found on the Lander Slope and in the Dubois area.

Potential reduction of nonnative species by the BLM and partners, such as the Fremont County Weed and Pest District, results in a beneficial impact to wildfire suppression by reducing unnatural fuel loading. Reducing nonnative species such as cheatgrass, which increases the intensity of fire behavior and may increase wildfire size and extent, would beneficially impact all resources and the fire program; infested sites generally result in poor reestablishment of native species after a wildfire event.

Actions that suppress the natural role of fire in the ecosystem may result in fuels buildup and eventually lead to larger and more landscape-level fires. However, suppressing fires in these areas may help to protect habitat important to sagebrush obligate species such as the greater sage-grouse. Establishing fuels treatments at strategic locations to minimize the size of wildfires and limit further loss of greater sage-grouse habitat would result in long-term benefits to fire and fuels management by reducing the incidence and spread of fire in greater sage-grouse habitat.

Maintaining connectivity between large blocks of undisturbed habitat for wildlife may result in an adverse impact to fuels management by limiting the size and extent of prescribed fire and other fuels treatment options, as well as limiting the use of wildland fire for resource benefit to maintain these large blocks of untreated land in similar vegetation types. Seasonal limits in crucial winter range and parturition areas would limit the time that fuels-reduction activities can take place and limit the effectiveness of the fuels management program over the next 20 years, unless an administrative exception is granted. Other potential adverse impacts include the limits on cross-country travel in areas with special status plant species, and restrictions on fire suppression strategies in greater sage-grouse critical areas.

Maintaining wild/feral horse objectives in Herd Management Areas (HMAs) would benefit fuels management because they regulate adverse impacts to vegetation communities from horses. Horses may also benefit from wildfire suppression by reducing the natural fuel loading associated with areas ungrazed by commercial livestock. These beneficial impacts are the same for livestock. Adverse impacts from livestock and, in some cases, horses occur due to moderate to high utilization levels that alter potential healthy vegetation community fuel loading in areas where fire is a desired tool, as well as hampering recovery of sites post-burn.

Management actions restricting fire suppression or wildland fire planning within Special Designation areas would result in adverse impacts to wildland fire management.

Maintaining WSAs results in beneficial impacts to natural management strategies for fire and fuels such as the use of wildland fire for resource benefit and prescribed fire. Adverse impacts associated with WSAs are due to restrictions on vehicle access to suppress fires and perform beneficial fuels treatments. ACEC actions common to all alternatives complement fuels management by authorizing fuels management treatments in the WUI and not closing the ACECs to fuels treatments. However, adverse impacts may result from seasonal limitations in ACECs on treatments that would reduce fuel loads and complement suppression tactics.

All alternatives authorize the use of heavy equipment for fire suppression in consideration of resource values, which would benefit fire and fuels management.

4.3.1.3.2. Alternative A

4.3.1.3.2.1. Program Management

Decisions in the existing plan (BLM 1987a) and the Southern Wyoming Zone FMP (BLM 2004b) guide current management actions regarding fire suppression. Wildland-fire suppression tactics follow direction and guidance in the Federal Wildland Fire Management Policy (DOI and USDA 2009). This guidance provides for consistent implementation of the Federal Wildland Fire Management Policy on BLM-administered lands. Under Alternative A, fire suppression is driven by property threats or resource benefits derived. Full suppression is used where it is clearly warranted because of potential resource damage and threats to persons or property (BLM 1987a). Soil-disturbing activities, such as the use of heavy equipment to fight fires, are allowed on a case-by-case basis.

4.3.1.3.2.2. Resources

Under Alternative A, restrictions on soil-disturbing activities on slopes over 25 percent would restrict fire suppression actions. The use of heavy equipment in certain strategic locations may limit the extent to which wildfires threaten critical resource values or health and human safety. Restricting the use of heavy equipment to suppress fires may result in adverse impacts to the management of wildland fires. Similarly, avoiding the aerial application of fire-suppressant chemicals within 300 feet of perennial waters and restricting the use of fire-retardant chemicals as appropriate to protect rock art and water quality would result in adverse impacts to the management of wildland fires by limiting the potential to effectively control fires in these areas. The Authorized Officer can waive all of these limitations.

Forest and woodland management complements wildfire suppression. Forest and woodland management works to achieve a variety of seral classes across the wooded landscape, which aids in reducing fire intensity, and assists with potential suppression strategies. Examples are found in treated juniper woodlands throughout the planning area and on Green Mountain, where a history of clear-cuts has altered the forest canopy and reduced fuel loading. Adverse impacts would result from human-caused fires in cutting areas from unintended ignitions and vehicle use in these areas.

Avoiding surface-disturbing activities in special status species habitat, such as sage-grouse nesting areas and pygmy rabbit habitat, would result in an adverse impact to fire suppression because of potential limitations on suppression tactics in these areas. These limitations may allow fires detrimental to landscapes to grow larger and result in more impacts in terms of acres burned.

4.3.1.3.2.3. Resource Uses

Under Alternative A, most of the planning area is open to wind-energy and mineral development. This development may result in adverse impacts to fire suppression in terms of increased potential for human-caused ignitions and increased infrastructure associated with this type of development, which makes fire suppression actions more challenging than when working on an undisturbed landscape. For example, placing wind turbines in an area with high wind potential would limit the use of aerial suppression techniques because of safety concerns. A beneficial impact may be the increased supporting road network associated with this development, which could be used strategically to suppress wildfires.

Livestock grazing management would result in short-term and long-term impacts to fire and fuels management. Livestock grazing primarily affects the distribution, amount, height, and vigor of herbaceous species such as perennial grasses, which can determine fire characteristics. Livestock grazing is beneficial to fire suppression efforts by reducing fine fuels. A decrease in fire spread may result in an accumulation of larger fuel sources such as shrub vegetation between fires, which may contribute to larger fires in the long term. Livestock grazing may also reduce flame length, fire-line intensity, and rate of spread, which would result in beneficial impacts to suppression activities. Fire-line intensity and flame length are important measures of potential suppression success.

Trails and travel management would result in both adverse and beneficial impacts to management of wildland fires. Travel designations provide access throughout the planning area, which may result in adverse impacts by increasing the incidence of human-caused fires. Increased access may also increase the potential for fire in more remote locations that are more difficult to respond to and control. Alternatively, motorized vehicle routes may result in beneficial impacts by increasing access, response time, and management flexibility when responding to fires.

Recreational activities can result in adverse impacts to wildland fire suppression due to the increased likelihood for fire starts in SRMAs and ERMAs, where both concentrated and dispersed use increases the likelihood for unintended ignitions. This impact would be consistent across all alternatives and would be a long-term impact because recreational use in the planning area is anticipated to steadily increase over the next 20 to 25 years.

The designation of utility corridors and authorization of ROWs may result in beneficial impacts to fire and fuels management by removing or reducing built-up fuels and by serving as fuel breaks and fire lines. Utility corridors and access roads authorized through ROW designations may also result in beneficial impacts by providing access for fire-fighting and other fire and fuels management activities. The designation of ROWs and increased incidence of human presence associated with ROW construction and use may increase the potential for unplanned ignitions in the planning area.

4.3.1.3.2.4. Special Designations

While WSA management could result in some adverse impacts to fire suppression by limiting potential suppression actions and access in these areas, this is generally not the case because fires can be contained within roads surrounding the designated areas. A notable exception may be within the Copper Mountain WSA because fuel loading outside that WSA is as heavy or heavier than fuel loading within the WSA. A restricted response to fire may cause the fire to move onto surrounding private lands.

ACEC management under Alternative A may limit fire suppression actions if roads have been reclaimed to help the resource that benefits from the ACEC designation. The reduction in roads to access wildfires may restrict suppression tactics and allow fires to grow larger and potentially cause resource damage and threaten health and human safety, especially in WUI areas.

4.3.1.3.3. Alternative B

4.3.1.3.3.1. Program Management

Under Alternative B, fire suppression is driven by threatened property or derived resource benefits. Full suppression is used when it is clearly warranted due to potential resource damage and threats to persons or property (BLM 1987a). Under Alternative B, full suppression is used in the WUI, developed recreation sites, identified cultural resources, and aboveground utility ROWs. Implementation of soil-disturbing activities (heavy equipment) to suppress fires is allowed only with the consent of the Authorized Officer in accordance with the approved FMP. Due to its emphasis on resource protection, Alternative B limits the use of a full suite of fire suppression tactics the most, when compared to other alternatives.

4.3.1.3.3.2. Resources

Management actions that restrict fire suppression, fuels management, or wildland fire planning would result in adverse impacts to wildland fire management. In general, restrictions on fire management for the protection of resource objectives are greater under Alternative B than under alternatives A and C. However, under certain scenarios, implementing actions under Alternative B could reduce the severity of landscape-level wildfires. For example, in areas where naturally caused fires were allowed to burn, fuel loads may be decreased over the long term.

Under Alternative B, restrictions on soil-disturbing activities on slopes over 15 percent may restrict fire suppression actions. The use of heavy equipment in certain strategic locations can limit the extent to which wildfires threaten critical resource values or health and human safety. Restricting the use of heavy equipment to suppress fires may result in adverse impacts to the management of wildland fires. Similarly, avoiding aerial application of fire-suppressant chemicals within 300 feet of perennial waters and restricting the use of fire-retardant chemicals as appropriate to protect rock art and water quality would result in adverse impacts to the management of wildland fires by limiting the potential to effectively control fires in these areas.

Forest and woodland management complements wildfire suppression. Forest and woodland management works to achieve a variety of seral classes across the wooded landscape, which aids in lessening fire behavior and contributing toward potential suppression strategies. Examples are found in treated juniper woodlands throughout the planning area and on Green Mountain, where a history of clear-cuts has altered the forest canopy and reduced fuel loading. Adverse impacts would result from unintended human-caused fires in cutting areas and vehicle use in these high fuel loading areas during the dry conditions of summer. Alternative B emphasizes using natural processes to manage forests and woodlands to the greatest extent possible, which may result in adverse impacts to wildland fire suppression. Fuel loading in these systems would be greater outside the WUI, areas managed for other resources (e.g., wildlife), or those areas treated to protect health and human safety, and could lead to landscape-level fire conditions. Prohibiting clear-cuts would lead to forest canopy fuel continuity in lodgepole stands, which makes fire suppression efforts challenging and extremely costly. Similar adverse impacts would result from a natural approach to management of forest stands experiencing large-scale die off of trees from insects and disease.

Prohibiting surface-disturbing activities within 1,320 feet of riparian-wetlands would result in an adverse impact to fire suppression by limiting the use of draft tanks for engines and tenders to access water sources in the event of a wildfire.

Expanded restrictions under Alternative B would potentially limit suppression actions. An example is the 1.5-mile buffer around active raptor nests where there can be no surface-disturbing or disruptive activities during the summer fire season. Closing areas with special status species plants may also similarly result in an adverse impact to fire suppression.

Greater sage-grouse management under Alternative B would result in adverse impacts to fire suppression, with restrictions on surface-disturbing and disruptive activities within 3 miles of nesting areas. Similarly, the restriction on surface-disturbing activities within 100 meters (approximately 330 feet) of suitable pygmy rabbit habitat would adversely impact potential suppression actions in these higher fuel loading shrub-steppe sites. These limitations may allow fires detrimental to landscapes to grow larger and result in a greater impact in terms of acres burned.

4.3.1.3.3.3. Resource Uses

Additional lands identified for disposal in areas of high fuel loading would result in beneficial impacts to the fire suppression program under Alternative B because responsibility for suppressing fires on those lands would not be the primary responsibility of the BLM, but will be undertaken by land managers with greater access to the property.

Impacts to fire and fuels management from the designation of utility corridors and ROW authorizations under Alternative B would be greater than under alternatives A and C because of the decreased area of designated ROW corridors and more ROW exclusion areas under Alternative B.

Under Alternative B, substantially less acreage is open to wind-energy and mineral development. Approximately 41,372 acres of BLM surface acres are open to wind energy, 954,776 acres are open to locatable mineral development, and 529,576 acres are open to mineral leasing under this alternative. The lower acreage open for development under Alternative B would result in beneficial impacts compared to alternatives A and C. Under Alternative B, there would be a lower incidence of human-caused fire across the landscape and more chance of less-complex fires because there would be less infrastructure supporting development. This would result in a lower occurrence of wildland fires and fewer wildland fire-suppression actions.

Adverse impacts to fire and fuels management from livestock grazing would be greater under Alternative B than under Alternative A or Alternative C because of a reduction in the level of grazing use and more areas being closed to livestock grazing. As a result, fine fuels buildup would increase and the size of fires would be expected to increase. A beneficial impact to fire and fuels management would result from an increase in acres treated because BLM funds would not be used to construct infrastructure but would be used for vegetation treatments.

Management for recreation would result in impacts to fire and fuels management similar to those under Alternative A, except that recreation management under Alternative B focuses on reversing the trend under Alternative A of moving toward a more urban recreation setting to moving toward a more primitive recreation setting. Because of the decreased focus on developing camping sites and other recreation sites under Alternative B, the adverse impacts may be reduced. However, the increased area managed as SRMAs may increase the potential for unplanned human-caused ignitions in these areas because of increased recreation activity, although Alternative B emphasizes nonmotorized recreation over motorized. Under all alternatives, recreational use in the planning area is anticipated to steadily increase over the next 20 to 25 years, which would result in adverse impacts to fire and fuels management.

Trails and travel management under Alternative B allows for the use of existing roads and trails throughout most of the planning area, with the use of only designated roads in a larger percentage of the planning area than Alternative A, and with seasonal restrictions in more areas. This could result in a beneficial impact to wildfire management in terms of reduced potential for human-caused fires due to reduced public access to areas with high fuel loading.

4.3.1.3.3.4. Special Designations

While WSA management could result in some adverse impacts to fire suppression in terms of limiting potential suppression actions and access in these areas, this is generally not the case because fires can be contained within roads surrounding the designated areas. A notable exception may be within the Copper Mountain WSA because the fuel loading outside that WSA is as heavy or heavier than fuel loading within the WSA, and a restricted response to fire may cause the fire to move onto surrounding private lands.

ACEC management under Alternative B may limit fire suppression actions if roads have been reclaimed to help the resource that benefits from the ACEC designation. The reduction in roads to access wildfires may restrict suppression tactics and allow fires to grow larger and potentially cause resource damage and threaten health and human safety and the WUI. The increased acreage within ACECs designated under Alternative B would lead to more complex challenges associated with suppression actions in terms of resource protection stipulations and actions that may be taken within ACECs to suppress wildland fires. This would be especially true of the expanded Green Mountain ACEC, the Government Draw/Upper Sweetwater Sage-Grouse ACEC, the South Pass Historic Mining Area ACEC, and the Lander Slope ACEC, which comprise an area with the highest proportion of fire starts in the planning area. A beneficial impact of the South Pass Historic Mining Area ACEC is the objective of reducing fuels within the WUI. This would benefit fire suppression by reducing fuel loading before wildfires and allow for greater success in effectively protecting homes and valuable cultural resources in the event of a local wildfire.

4.3.1.3.4. Alternative C

4.3.1.3.4.1. Program Management

Alternative C allows the most resource use of the three alternatives and fire suppression actions under Alternative C are the least restricted. Soil-disturbing activities, such as the use of heavy equipment for the purposes of direct fire suppression, are permitted across a greater area under this alternative. In general, restrictions on fire management for the protection of other resource objectives are the fewest under Alternative C.

4.3.1.3.4.2. Resources

Avoiding soil-disturbing activities on slopes over 25 percent and the aerial application of fire-suppressant chemicals within 300 feet of perennial waters, and restricting the use of fire-retardant chemicals as appropriate to protect rock art and water quality would result in similar adverse impacts as those described under Alternative A.

Under Alternative C, impacts to the suppression of wildland fires in forest and woodland areas would be similar to those under Alternative A, but less than those under Alternative B. Forest and woodland management works to achieve a variety of seral classes across the wooded landscape, which aids in lessening fire behavior and helps potential suppression strategies. Alternative C allows for more aggressive forest management, which would benefit fire suppression with larger patch sizes of early seral communities. Examples are found in treated juniper woodlands throughout the planning area and on Green Mountain, where a history of clear-cuts has altered the forest canopy and reduced the fuel loading. Adverse impacts would result from human-caused fires in cutting areas and unintended ignitions and vehicle use within these cutting areas. These types of ignitions would increase under Alternative C.

Management of grassland/shrubland communities under Alternative C would benefit wildfire suppression by reducing fine-fuel loading associated with increased fire behavior. The reduction in fine fuels would result from more livestock use across the planning area.

Reviewing fire suppression impacts to special status species on a case-by-case basis would result in the same adverse impacts as described for Alternative A.

Many wildlife restrictions under Alternative C, including distance requirements for surface-disturbing activities around sage-grouse leks and actions in occupied pygmy rabbit habitat, are similar to those under Alternative A. These restrictions would result in an adverse impact to fire suppression activities. This would potentially limit suppression actions and allow fires detrimental to the landscape to grow larger and cause more impacts in terms of acres burned. The restriction on surface-disturbing and surface-disruptive activities within ¼ mile of active raptor nests could adversely impact wildland fire suppression.

4.3.1.3.4.3. Resource Uses

Under Alternative C, wildland fire would be used to restore fire-adapted ecosystems for commodity production and to reduce hazardous fuels. Alternative C places more emphasis on fire and fuels management for the use of resources compared to Alternative B, which uses wildland fire to restore the natural processes of ecosystems.

Under Alternative C, most of the planning area is open to wind-energy and mineral development. This development may result in adverse impacts to fire suppression in terms of increased potential for human-caused ignitions and increased infrastructure associated with this type of development, which makes fire suppression actions more challenging than when working on an undisturbed landscape. A beneficial impact may be the increased supporting road network associated with this development, which can be used strategically to suppress wildfires.

Trails and travel management under Alternative C allows use of existing roads and trails throughout most of the planning area, with seasonal restrictions in certain locations. This may result in an adverse impact to wildfire management in terms of increased potential for human-caused fires and increased public access to areas with high fuel loading. A beneficial impact under Alternative C would result from a higher level of access from established roads for the purposes of implementing fire suppression actions.

Livestock grazing in relation to fire suppression activities under Alternative C would result in impacts similar to those under Alternative A, but less than those under Alternative B. Livestock grazing may be beneficial to wildland fire suppression by reducing fuel loading through the use of grazing animals and consequentially, a net reduction in extreme fire behavior. However, under

Alternative C, like Alternative A, approximately one-third of the amount of acres would have vegetation treatments compared to Alternative B.

Recreational activities can result in adverse impacts to wildland fire suppression with an increased likelihood for fire starts in SRMAs and ERMAs, where both concentrated and dispersed use increases the likelihood for unintended fire starts. Alternative C is more likely to increase the trend toward an urban recreation setting with increased emphasis on motorized vehicle recreation. This may increase adverse impacts to the fire and fuels management program identified under other alternatives because recreation is anticipated to consistently increase over the next 20 to 25 years. Under Alternative C, this increase would likely be in motorized recreation, not nonmotorized recreation as under Alternative B.

4.3.1.3.4.4. Special Designations

Alternative C includes no other specific restrictions on fire and fuels management related to resource objectives or special designations in addition to the restrictions and impacts described under *Impacts Common to All Alternatives*. Alternative C would allow for a greater use of all available fire suppression and management tactics when compared to Alternative A or B.

4.3.1.3.5. Alternative D

4.3.1.3.5.1. Program Management

Alternative D uses a full range of suppression tactics based on resources at risk. This would result in comparable strategies to Alternative C and less restrictions to the fire and fuels program than under Alternative B, under which full suppression of wildfires is limited to specific management and development issues close to the wildfire. Alternative D has the second fewest resource utilization management actions next to Alternative B. In general, Alternative D restrictions on wildfire management specifically for the protection of other resource objectives are fewer than under Alternative B but more than under Alternative C, under which a full suite of suppression tactics would be utilized throughout the planning area.

4.3.1.3.5.2. Resources

Similar to alternatives A and C, avoidance of soil-disturbing activities on slopes over 25 percent can restrict fire suppression actions under Alternative D by limiting heavy-equipment use in certain strategic locations, potentially restricting suppression tactics that may limit the extent of wildfires threatening critical resource values or health and human safety. Similarly, avoiding aerial application of fire retardants within 300 feet of any waterbody and 500 feet of waterbodies that support certain sensitive fish species would result in a smaller adverse impact to fire suppression than Alternative B but larger than either Alternative A or Alternative C, under which 300 feet is specified for all waterbodies. However, in all cases, the Authorized Officer can waive these distance limits under appropriate circumstances and therefore reduce restrictions on fire suppression tactics where necessary to successfully slow an active wildfire.

Under Alternative D, impacts to the suppression of wildland fires in forest and woodland areas are similar to those under Alternative A, less than those under Alternative B, and more than those under Alternative C. Forest and woodland management works to achieve a variety of seral classes across the wooded landscape, which aids in lessening fire behavior and helps potential suppression strategies. Alternative D authorizes more aggressive forest management where appropriate, which would benefit fire suppression with larger patch sizes of early seral communities. Examples are found in treated juniper woodlands throughout the planning area and on Green Mountain, where a history of clear-cuts has altered the forest canopy and reduced fuel loading. Adverse impacts would result from human-caused fires in cutting areas and from unintended ignitions and increased vehicle use in these cutting areas. There would be more of these types of ignitions under Alternative D than under Alternative B, and approximately the same as under alternatives A and C.

Management of grassland/shrubland communities under Alternative D would benefit wildfire suppression by reducing fuel loading associated with fire severity and intensity. The reduction in fuel loading would be the result of using vegetation treatments to change vegetation community composition and maintenance of livestock use throughout the planning area.

Many wildlife restrictions under Alternative D, including distance requirements for surface-disturbing activities around sage-grouse leks in the Core Area and actions in occupied pygmy rabbit habitat, are similar to Alternative B. However, Alternative D is less restrictive outside the Core Area than Alternative B. Restrictions would result in adverse impacts to fire suppression activities. This would potentially limit suppression actions and allow fires detrimental to the landscape to grow larger and cause more impacts in terms of acres burned. The restriction on surface-disturbing and disruptive activities within ¼ mile of active raptor nests may adversely impact wildland fire suppression.

Reviewing fire suppression impacts to special status species on a case-by-case basis would result in the same adverse impacts as described for Alternative A.

4.3.1.3.5.3. Resource Uses

Under Alternative D, wildland fire would be used to restore fire-adapted ecosystems for a diversity of plant types and to reduce hazardous fuels. Alternative D places less emphasis on fire and fuels management for the use of resources than Alternative C, and is more similar to Alternative B with respect to the use of fuels and fire to restore the natural processes of ecosystems.

Under Alternative D, a smaller amount of the planning area is open to wind-energy and mineral development than under Alternative A, substantially smaller than under Alternative C, but more than Alternative B. Reduced development would beneficially impact fire suppression in terms of reduced potential for human-caused ignitions and increased infrastructure associated with this type of development, which makes fire suppression actions more challenging than when working on an undisturbed landscape. An adverse impact may result due to a reduction in the supporting road network associated with this development, which can be used strategically to suppress wildfires. However, it is anticipated that this adverse impact would be negligible.

Trails and travel management allows use of existing roads and trails throughout most of the planning area, with seasonal restrictions in certain locations. This could adversely impact wildland fire management because of the increased potential for human-caused fire starts through increased public access to areas with high fuel loading. Over time, Alternative D, like Alternative B, could result in more adverse impacts because redundant roads could be reclaimed, thereby reducing the level of access from established roads for the purposes of implementing fire suppression actions.

Livestock grazing in relation to fire suppression activities would result in impacts similar to those under Alternative C, more beneficial than Alternative B because higher utilization levels of herbaceous forage could lead to less fuel buildup. Livestock grazing can be beneficial to wildland fire suppression by reducing fuel loading through the use of grazing animals and consequentially, a net reduction in extreme fire behavior. However, under Alternative D, like alternatives A and C, approximately 10,000 acres are likely to be treated over the life of the plan because of the emphasis on range infrastructure projects. This is opposed to Alternative B, under which vegetation communities would be more aggressively treated to reduce fuel loading on the landscape and improve overall ecological conditions, thereby eventually leading to less extreme wildfire behavior in many areas of the planning area.

Recreational activities can adversely impact wildland fire suppression with an increased likelihood for human-caused ignitions in SRMAs and ERMAs, where both concentrated and dispersed use increases the likelihood for unintended fire starts. Alternative D is more likely to trend away from an urban recreation setting to a more primitive recreation setting with an emphasis on nonmotorized vehicle recreation, similar to Alternative B. This could reduce adverse impacts to the fire management program compared to those identified under alternatives A and C.

4.3.1.3.5.4. Special Designations

While WSA management could result in some adverse impacts to fire suppression in terms of limiting potential suppression actions and access in these areas, this is generally not the case because fires can be contained within roads surrounding the designated areas. A notable exception could be in the Copper Mountain WSA, because the fuel loading outside the WSA is as heavy or heavier than fuel loading within the WSA and a restricted response to fire could cause the fire to move onto surrounding private lands. This case is a limited example because there is very little fire history for the area.

ACEC management under Alternative D could limit fire suppression actions if roads have been reclaimed to help the resource that benefits from ACEC designation. The reduction in roads to access wildfires could restrict suppression tactics and allow fires to grow larger and potentially cause resource damage. The increased acreage designated as ACECs under Alternative D would lead to more complex challenges associated with suppression actions in terms of resource protection stipulations and actions that can be taken in ACECs to suppress wildland fires. This would be especially true of the expanded Green Mountain ACEC, the Twin Creek ACEC, the South Pass Historic Landscape ACEC, and the Lander Slope ACEC, which comprise an area with the highest proportion of fire starts in the planning area. A beneficial impact of the South Pass Historic Mining Area ACEC is the objective of reducing fuels in the WUI. This would be a beneficial impact to fire suppression by reducing fuel loading before wildfires occur, and could allow for more effective protection of homes and valuable cultural resources in the event of a local wildfire.

Adverse impacts to fire and fuels management from VRM classifications would be similar to those described for Alternative A. However, because the amount of VRM Class I and II area is greater under Alternative D, fire suppression tactics would be less flexible except in cases of protecting human lives and safety.

4.3.2. Planned/Prescribed Fires and Other Fuels Treatments

4.3.2.1. Summary of Impacts

Prescribed fire management can be used to achieve measurable landscape-level or site-specific objectives, such as reducing hazardous fuel loads inside and outside the WUI, creating diversity in vegetation communities, enhancing livestock management, improving certain desirable wildlife habitats, regenerating decadent vegetation communities, and improving watershed health. Most prescribed fires in the planning area occur in mountain shrub and aspen communities. Non-fire fuels treatments will occur in all vegetation types, from Wyoming sagebrush steppe to conifer forests and aspen stands. Stipulations from other resource management that allow or prohibit prescribed fires and fuels management in certain areas or at certain times of the year are direct impacts to fuels management.

4.3.2.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The BLM fire and fuels program is guided by the principles of reducing hazardous fuels loading within the WUI as well as high fuel loading across the vegetated landscape. The program is complementary to wildlife and vegetation management by restoring fire-dependent ecosystems and enhancing vegetation communities and wildlife habitat.
- Fire and fuels management will be a priority within the WUI as well as within areas of the natural landscape that would be detrimentally impacted by wildfire.
- Air quality standards do not currently affect the ability to perform prescribed burns; however, more stringent air quality standards would likely affect prescribed burn implementation.
- Development of infrastructure such as for oil and gas or wind energy limit or close areas to the use of fire as a vegetation treatment tool.
- The Lander Field Office will continue to treat vegetation in the planning area with prescribed fire, mechanical treatments, and chemical treatments. It is expected that the average annual acres treated in the future will remain similar to average annual acres treated between 2006-2009, except for under Alternative B, under which additional fuels treatment would be undertaken.
- Landscape-level fire and non-fire fuels treatments that meet vegetation management and wildlife habitat requirements will substantially increase the amount of acres treated annually in the planning area. The use of landscape-level treatments will be enhanced or hindered depending on a number of factors, including livestock grazing management decisions that allow proper post-treatment and long-term management; increasing industrial and urban development in the WUI; future wildlife habitat considerations; and the ability to coordinate with adjacent state, federal and private landowners.

4.3.2.3. Detailed Analysis of Alternatives

4.3.2.3.1. Impacts Common to All Alternatives

Short- and long-term impacts from prescribed fire and fuels management would assist in achieving program specific management objectives as well as other resource objectives.

Air quality regulations are the most restrictive and could adversely impact fire and fuels management in Federal Class I and Class II areas (e.g., the Wind River Slope on the WRIR). Regulations in these areas could restrict some prescribed burn activity, depending on the prevailing wind and disturbance to population centers. Most often, in fuels treatments using fire, the greatest concern is smoke dispersion and distance from population centers. In these cases air quality regulations are neither a beneficial or adverse impact on prescribed fire activities. While there is a marginal difference among the alternatives in the management prescriptions for air quality, it is unlikely that these management differences would have measurable differences in impacts to the fire and fuels program.

Soil resource management can limit vegetation management options through restrictions on ground-disturbing activities when the ground is frozen and, in such cases, would result in an adverse impact to fire and fuels management. Many shrub and forest/woodland treatments are ideally implemented when the ground is frozen and vegetation is lower in moisture and brittle. Additionally, restricting winter fuels treatments reduces the amount of acres potentially treated in the year. A BLM Authorized Officer may grant an exception to this standard stipulation.

Forest and woodland management complements fire and fuels management and is a beneficial impact to fuels management. Forest treatment objectives can also accomplish fuels reduction objectives, especially in the WUI. Mechanical treatments completed in forests and woodlands can also create fuels breaks that could be used to contain prescribed fire and reduce adverse impacts from fire by reducing the fire severity associated with heavy 1,000-hour fuel loading. Forest treatments also complement fire and fuels management by achieving fuels goals of restoring ecosystem health. Additionally, the use of wildland fire is a management tool in forests and woodlands and is complementary to the landscape level use of fire.

Grassland and shrubland management actions across all alternatives would result in beneficial impacts to fire and fuels management because they support the use of vegetation treatments to increase forage production and restore rangeland ecosystems. This conversion to early seral plant communities achieves fuels management objectives and is integral to cooperator buy-in to initiating prescribed burning and mechanical treatments on rangelands throughout the planning area. This impact would be similar across all alternatives with minor differences in vegetation management focus. However, to the extent that livestock grazing adversely impacts aspen from wildlife grazing/browsing or if treatments cannot be accomplished, then livestock grazing management adversely impacts the fire and fuels program.

Management actions for invasive species would benefit fuels management by reducing nonnative species, such as cheatgrass. Nonnative species such as cheatgrass adversely impacts fire and fuels management. It limits the use of prescribed fire and most mechanical treatments because of the high probability of proliferation of the annual grass in certain areas after fuels treatment.

Seasonal big game winter range and parturition areas could limit fuels management actions if roads have been reclaimed to benefit the resource associated with these areas. The reduction in roads to access potential treatment areas could restrict management strategies associated with prescribed fire or wildland fire utilized to achieve resource benefits. This would result in an adverse impact to fire and fuels management. Seasonal closures would also adversely impact fuels treatments by limiting surface-disturbing and disruptive activities in elk winter range and constraining the time available to treat vegetation, hindering the fuels management program's ability to treat areas in the planning area over the next 20 years.

Overall, wildlife habitat management is beneficial to fuels management. The wildlife program's emphasis on using a full suite of treatment tools to improve habitat types and adjustment of wildlife herd objectives may promote beneficial impacts to vegetative communities and support fuels treatment objectives.

Greater sage-grouse management is a beneficial impact to fuels management if it emphasizes a mosaic of various vegetative seral conditions across the landscape, which reduces the adverse impacts of high vegetative fuel loading and restores vegetation communities. The restriction on vegetative treatments within either ¼ mile or 0.6 mile from an active sage-grouse lek adversely impacts the fire and fuels program by limiting areas that would benefit from fuels treatments. Seasonal stipulations for greater sage-grouse result in a minor adverse impacts because of limits on time available to complete fuels treatments.

Limits on surface-disturbing activities in occupied pygmy rabbit habitat would adversely impact fuels management. Pygmy rabbit habitat in the planning area is often mountain shrub communities, a vegetation type that benefits from the use of prescribed fire or potentially wildland fire that is utilized to achieve resource benefits.

Implementation of the current FMP (BLM 2004b) would be influenced by constraints to protect and conserve habitat of special status species. Conservation measures to protect and restore species listed under the ESA would potentially result in adverse long-term impacts to fuels management within listed species habitat.

Where there is livestock grazing, it is BLM policy that prescribed burn areas are deferred from grazing a minimum of two consecutive growing seasons, based on management objectives consistent with *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management* (Appendix J (p. 1437)) and IM No. WY-2005-018. The BLM will use environmental and rangeland conditions to identify whether the two-season period has provided enough recovery time. Land ownership patterns in the planning area can impede the ability to conduct prescribed burns. Prescribed burns generally are not possible where domestic livestock producers are unable to absorb the cost of the deferral period, as required by BLM policy, which could be alleviated by the development of a grass bank. The inability to adhere to this policy could adversely impact prescribed fire management by restricting the ability to use prescribed fire as a management tool. Non-fire fuels management (chemical, hand cutting, and mechanical) could have similar adverse impacts due to post-treatment grazing management and unanticipated long-term use, development on and surrounding the treatment, and overall management of the area. The use of wildland fire that is utilized to achieve resource benefits (Wildland Fire Use) would also be adversely impacted by the same grazing management restrictions that will not allow sufficient post-burn rest similar to that for prescribed fire.

While WSA management could result in some adverse impacts to fuels management in terms of limiting potential fuels treatment actions and access in these areas, this is generally not the case because fuels management options in these areas can be implemented through hand cutting or the use of prescribed fire if determined to be suitable for the landscape. Wildland fire that is utilized to achieve resource benefits is ideally suited to WSAs and results in a beneficial impact to that application under the fire and fuels program.

Management of areas such as Green Mountain, Red Canyon, South Pass Historic Mining Area, and Lander Slope would also be beneficial to fire and fuels management in its support for management of healthy vegetation communities to support wildlife. This would complement fuels management objectives of managing vegetation to reduce fuels loading and restoring ecosystem health.

There is little to no difference among the alternatives with regard to land tenure decisions, which would adversely impact fuels management because some broken land status areas not identified for disposal are very difficult to access and are difficult to manage. These areas could also create large WUI areas that require substantial time and resources to treat, as opposed to treating larger blocks of BLM-administered land that dominate the planning area. Notable examples are found on the Lander Slope, the South Pass area, and on scattered BLM holdings in the Dubois area. Because there is little difference among the alternatives, this adverse impact to the fire and fuels program is not further analyzed.

The alternatives vary in their minerals and realty management. Development associated with minerals and realty actions such as wind-energy projects, could adversely impact fuels management by fracturing the landscape and making the use of prescribed fire extremely challenging and increasing the complexity of the burn. Using wildland fire to achieve resource benefits could be difficult in these situations. A beneficial impact could be the increased supporting road network that is associated with wind-energy and mineral development, which could be used strategically to break up the landscape when using prescribed fire so as to not burn too much of the vegetation community deemed critical for wildlife habitat. The areas could also warrant fuels treatments, not to restore ecological health with fire or surrogate mechanical treatments, but simply to reduce fuel loading to protect human infrastructure. This would be an adverse impact from wind and mineral development.

4.3.2.3.2. Alternative A

4.3.2.3.2.1. Program Management

Alternative A uses prescribed fire and fuels management to meet fire and fuels resource management objectives, reduce hazardous fuels, reintroduce fire in its natural role to the ecosystem, and improve plant community health. Wildland fire that is utilized to achieve resource benefits could occur throughout the planning area, but has not been attempted on any scale because of management restrictions and the general uncertainty of the approach outside wilderness areas in the region. Approximately 300 acres per year of short-term disturbance over 20 years is anticipated from prescribed fire under Alternative A. All acres of this disturbance would be reclaimed. For mechanical fuels treatments under this alternative, approximately 500 acres per year for 20 years of short-term disturbance are anticipated, and all 500 acres would be reclaimed. Under Alternative A, little to no funds would be expended on non-infrastructure types of range improvement projects such as vegetation treatments and fuels reduction because all available funds would be invested in rangeland infrastructure.

4.3.2.3.2.2. Resources

Under Alternative A, avoiding soil disturbance on slopes over 25 percent and within 500 feet of surface water could may adversely impact fuels management, although erosion from soil-disturbing activities could be mitigated with practices such as contour falling and treatments when ground conditions are stable. Similarly, restoration of surface water systems, often directly within the riparian-wetland area, is important to achieving fuels reduction objectives (especially with the presence of riparian-wetland INNS such as Russian olive) and restoring riparian-wetland system function and ecosystem health. A beneficial impact would be the management action of achieving PFC in riparian-wetland systems, which complements fuels management in these areas.

Prohibiting surface-disturbing and disrupting activities within ¾ mile of active raptor nests is considered an adverse impact to fuels management. Similarly, protections for the benefit of greater sage-grouse would result in adverse impacts to fuels management. Alternative A has moderate greater sage-grouse protections with moderately adverse impacts to the fire programs.

4.3.2.3.2.3. Resource Uses

Lands and realty actions can adversely impact fuels management, because some areas with mixed ownership patterns not identified for disposal are very difficult to access and are difficult to manage. These areas also might create large WUI areas that require substantial time and resources to treat, as opposed to treating larger blocks of BLM-administered land that dominate the planning area. Notable examples are found on the Lander Slope and in the Dubois area.

Under Alternative A, most of the planning area is open to wind-energy and mineral development. This development could adversely impact fuels management in terms of fracturing the landscape and making the use of prescribed fire extremely challenging, and increasing the complexity of the burn. Wildland fire that is utilized to achieve resource benefits might be impossible in these situations. A beneficial impact might be the increased supporting road network associated with wind-energy and mineral development, which can be used strategically to break up the landscape when using prescribed fire so as to not burn too much of the vegetation community that might be deemed critical for wildlife habitat.

Under Alternative A, trails and travel management allows use of existing roads and trails throughout most of the planning area, with seasonal restrictions in special designations. This would be a beneficial impact in terms of allowing access to treatment areas and the use of existing roads for strategic breaks in prescribed fire and wildland fire that is utilized to achieve resource benefits.

Livestock grazing could be beneficial to fuels management objectives under Alternative A, especially in the WUI, because grazing would reduce the amount of fine fuels available in the event of a wildfire. Research has shown that certain plant communities may benefit from low-severity disturbances, such as grazing, before burning in order to increase their resilience to more severe disturbances, such as fire (Davies et al. 2009b). However, an adverse impact of grazing would be the potential proliferation of nonnative invasive species, as grazing livestock utilize desirable native grasses. Nonnative species such as cheatgrass often render an area untreatable with fire if the species dominates an area. There would be the same number of acres treated for fuels reduction as historically has been the case (500 acres per year) because range improvement projects would emphasize infrastructure and not vegetation type projects.

4.3.2.3.2.4. Special Designations

ACECs with seasonal travel management closures to protect ACEC values could adversely impact fuels management. The closures reduce the timeframes available to conduct fuels management projects. The ACECs with seasonal closures are Green Mountain, Whiskey Mountain, Red Canyon and Lander Slope. The remainder of the ACECs would not impact fuels management.

4.3.2.3.3. Alternative B

4.3.2.3.3.1. Program Management

Similar to Alternative A, Alternative B uses prescribed fire and fuels management to achieve fire and fuels management objectives, reduce hazardous fuel loads, and reintroduce fire into its natural role in the ecosystem. This approach could result in a beneficial impact to fire management in the planning area. For mechanical fuels treatments under this alternative, approximately 1,500 acres per year for 20 years of short-term disturbance are anticipated, with all 1,500 acres (1,000 more acres than Alternative A) to be reclaimed.

4.3.2.3.3.2. Resources

Under Alternative B, protections for soil and riparian-wetland areas would limit fuels management with more adverse impacts to the fuels program than under Alternative A. Buffers around riparian-wetland areas may result in adverse impacts to fire management when they inhibit achieving fuels reduction objectives (especially with the presence of riparian-wetland invasives such as Russian olive). A beneficial impact would result from achieving PFC in riparian-wetland systems, which complements fuels management.

Prohibiting surface-disturbing and disrupting activities within 1.5 miles of active raptor nests and limiting surface disturbance in buffers around greater sage-grouse leks would have more of an adverse impact than Alternative A to fuels management, such as prescribed fire, especially in the mountain shrub-woodland interface, which demonstrates the greatest benefit from mechanical and fire treatments.

Alternative B VRM would limit more surface disturbance, which would beneficially impact fire and fuels except to the extent that additional roads improve access for the fuels program.

4.3.2.3.3.3. Resource Uses

Minerals and realty management, including wind-energy development, under Alternative B is substantially more restrictive than under Alternative A with beneficial impacts to fire and fuels management.

Under Alternative B, less land is open for wind-energy and mineral development and in lands that are open, there are more restrictions on development. While the reduced amount of development in comparison to Alternative A would reduce the associated adverse impacts, there would also be reduced roads that would facilitate access for fuels treatments and fire suppression. Overall, Alternative B has more beneficial impacts to the fuels program than Alternative A.

Trails and travel management under Alternative B is limited compared to alternatives A and C. Use of existing roads and trails would be beneficial to fuels management, while seasonal restrictions in special designations would be an adverse impact. Access to treatment areas and the use of existing roads for strategic breaks is important to achieve resource benefits from prescribed burning and, if appropriate to resource objectives, wildland fire.

Under Alternative B, livestock grazing could be beneficial to fuels management objectives, especially in the WUI, as grazing livestock would reduce fine fuels available in the event of a wildfire. The establishment of reserve common allotments would also be a beneficial impact to fuels management because it allows greater flexibility in treating areas with prescribed fire and in resting them subsequently. This could better enable the utilization of wildland fire to achieve resource benefits. In addition, Alternative B emphasizes non-infrastructure range improvement projects, which would beneficially impact the fire and fuels program. Finally, Alternative B beneficially impacts the fuels program by making INNS introduction and spread less likely. INNS, such as cheatgrass, often render an area untreatable with fire where they become dominant, as fires burn hotter and increase the likelihood that cheatgrass or other INNS will continue to revegetate and outcompete native species.

4.3.2.3.3.4. Special Designations

Special designations would beneficially impact the natural fire regime under Alternative B in the long term, with additional acreage protections and stipulations that restrict disturbances in these areas. The opportunity to manage historically natural landscapes under this alternative would allow the restoration of areas using natural processes and emphasize treatments suitable for the landscape. Alternative B allows vegetation treatments and fuels management in ACECs. Many of these ACECs contain WUI areas that would be beneficially impacted from prescribed fire and other fuels management treatments.

Adverse impacts under this alternative would be restrictions on types of treatments. (Timing limitations also limit fuels treatment in the Green Mountain area, but this is for wildlife protections and not part of the ACEC prescriptions.) This would slow the restoration process in areas such as Green Mountain, where aspen communities are in poor ecological health and mountain shrub communities are decadent and dominated by late seral vegetation assemblages.

ACEC management under Alternative B could limit fuel treatment options if roads have been reclaimed to help benefit the resource associated with the ACEC designation. A beneficial impact of the South Pass Historic Mining Area ACEC would be the objective of reducing fuels in the WUI. This would benefit fire suppression by reducing fuel loading before wildfires and could allow for more effective protection of homes and valuable cultural resources in the event of a wildfire.

4.3.2.3.4. Alternative C

4.3.2.3.4.1. Program Management

Alternative C uses prescribed fire and fuels management to meet fire and fuels resource management objectives, reduce hazardous fuels, reintroduce fire in its natural role to the ecosystem, and improve plant community health. In light of the emphasis on full suppression in this alternative, it is likely that wildland fire would not be utilized to achieve resource benefits. Similar to Alternative A, approximately 300 acres per year of short-term disturbance over 20 years is anticipated from prescribed fire under Alternative C. For mechanical fuels treatments under this alternative, approximately 500 acres per year for 20 years of short-term disturbance is anticipated. All acres of this disturbance would be reclaimed. Similar to Alternative A, little or no funds would be expended on non-infrastructure types of range improvement projects such as vegetation treatments and fuels reduction because all available funds would be invested in rangeland infrastructure.

4.3.2.3.4.2. Resources

Under Alternative C, avoiding soil disturbance for the protection of soil, water and riparian-wetland resources would adversely impact fuels management unless these limitations were mitigated to allow fuels treatment. Alternative C is more likely to achieve improvements in riparian-wetland condition and PFC because infrastructure would be employed to fence out these areas, which complements fuels management.

Prohibiting surface-disturbing and disrupting activities within ½ mile of active raptor nests under Alternative C is less restrictive than Alternative A, but would still adversely impact fuels management. Alternative C has the same greater sage-grouse management as Alternative A with the same limited adverse impacts to the fire and fuels program, particularly in comparison to Alternative B.

Alternative C VRM is similar to Alternative A, except less restrictive, with the same moderately adverse impact to the fuels program by allowing more surface disturbance. However, as is further analyzed below under *Resource Uses*, more development would improve fire management to the extent that additional roads would be authorized improving access.

4.3.2.3.4.3. Resource Uses

Under Alternative C, most of the planning area is open to wind-energy and mineral development. This development could adversely impact fuels management in terms of fracturing the landscape and making the use of prescribed fire extremely challenging and increasing the complexity of the burn. Utilizing wildland fire to achieve resource benefits might be difficult in these situations. A beneficial impact could be the increased supporting road network associated with this wind-energy and mineral development, which could be used strategically to break up the landscape when using prescribed fire so as to not burn too much of the vegetation community that could be critical as wildlife habitat.

Trails and travel management under Alternative C allows use of existing roads and trails throughout most of the planning area, with seasonal restrictions in special designations. This would be a beneficial impact in terms of allowing access to treatment areas and the use of existing roads for strategic breaks in prescribed fire and wildland fire that is utilized to achieve resource benefits.

Livestock grazing could be beneficial to fuels management objectives, especially in the WUI, by reducing fine fuels often associated with increased fire behavior. An adverse impact would be the potential proliferation of INNS if improper livestock grazing management occurs. INNS, such as cheatgrass, often render an area untreatable with fire if the species dominates an area, leading to a higher probability of wildfire burning at a fire return interval earlier than historic occurrence. Livestock grazing management under this alternative, however, will utilize infrastructure types of range improvements with less or no vegetation treatments or aspen or riparian-wetland treatments. Alternative C, like Alternative A, would treat approximately one-third the acres as Alternative B with resulting increased adverse impacts.

4.3.2.3.4.4. Special Designations

Alternative C, like Alternative A, affords minimum protections to NHTs and no protections to the National Scenic Trails. It is likely that more surface disturbance with accompanying adverse impacts to the fire and fuels program would result in comparison to Alternative B.

Alternative C manages areas that are designated as ACECs in other alternatives with standard stipulations which will result in more surface disturbance and more development. Both of these activities would adversely impact the fire and fuels program, although improved access associated with development may, on a site-specific basis, have beneficial impacts. On a short- and long-term basis, reduced limitations on the use of prescribed fire in an ACEC or within the historical setting of an ACEC (or Trail) may beneficially impact the fire and fuels program.

4.3.2.3.5. Alternative D

4.3.2.3.5.1. Program Management

Similar to alternatives A, B, and C, Alternative D uses prescribed fire and fuels management to achieve fire and fuels resource management objectives, reduce hazardous fuel loads, and reintroduce fire in its natural role into the ecosystem. This approach could result in a beneficial impact to fire management in the planning area. Opportunities for wildland fire that are utilized to achieve resource benefits would be limited under Alternative D. Approximately 500 acres per year of short-term disturbance over 20 years is anticipated from prescribed fire treatment and 500 acres per year of short-term disturbance over 20 years is anticipated from mechanical treatments, the same as under alternatives A and C and approximately one-third that under Alternative B.

4.3.2.3.5.2. Resources

Under Alternative D, allowable emission levels are the same as alternatives A and C and potentially less restrictive than under Alternative B. Soil, water, and riparian-wetland protections are similar to those under alternatives A and C within the same moderately adverse impacts to fire and fuels, although substantially less adverse than under Alternative B.

As for alternatives A, B, and C, forest and woodland management complements prescribed fire and fuels management under Alternative D. Forest treatment objectives can also accomplish fuels reduction objectives, especially in the WUI. Mechanical treatments completed in forest and woodlands can also create fuel breaks that could be used to contain prescribed fire and reduce the adverse impacts from fire by reducing the fire severity associated with heavy 1,000-hour fuel loading. Specifically under Alternative D, forest treatments also complement prescribed fire and fuels management because they achieve fuels goals of restoring ecosystem health and, in areas where it is appropriate, allow the use of all silvicultural techniques to actively manage forests associated with 1,000-hour fuel loads. Wildland fire that is utilized to achieve resource benefits is supported by forest and woodland management under Alternative D, although not as likely a management decision as under Alternative B.

Similar to alternatives A, B, and C, grassland and shrubland management under Alternative D complements fire and fuels management. Alternatives A, C, and D could result in moderate adverse impacts to the use of wildland fire for resource benefit, the use of prescribed fire, and some mechanical treatments. Equal support for restoration of native plant communities associated with fuels management and providing for livestock forage on BLM-administered lands has historically made rangeland vegetation treatments difficult to implement to ensure the long-term reestablishment of healthy early seral plant communities. Alternative D also could result in beneficial impacts to fuels management from the management of shrubland and grassland communities using seral-state attributes described in the NRCS ecological site descriptions, which, if properly implemented, are synonymous with the tools provided by fire and fuels management. Grassland and shrubland management actions under Alternative B would be most beneficial to fire and fuels management, with less substantial beneficial impacts under alternatives A, C, and D. Restoration of these surface water (riparian) systems, often directly within the riparian-wetland area, is important to achieving fuels reduction objectives (especially with the presence of riparian-wetland INNS such as Russian olive) and restoring riparian-wetland system function and ecosystem health. A beneficial impact would be the management action of achieving PFC in riparian-wetland systems, which complements fuels management objectives.

Cheatgrass adversely impacts fire and fuels management. It limits the use of prescribed fire and most mechanical treatments because of the high probability of proliferation of the annual grass after fuels treatment. Aggressive management of INNS, notably cheatgrass, would be a beneficial impact of invasive species management and considered to be the same under alternatives D and B.

Wildlife management actions under Alternative D are similar to Alternative B but less restrictive. These protections, such as restrictions to surface-disturbing and disruptive activities in elk winter range would adversely impact fuels management because they constrain the time available to treat vegetation and hinder the fuels program's ability to treat areas in the planning area over the next 20 years. Protections for raptors and greater sage-grouse would adversely impact the fire and fuels program but less than under Alternative B, which has more restrictive prescriptions. Wildlife protections, including limitations on surface disturbance for the benefit of wildlife under Alternative D, would have more adverse impacts than under alternatives A and C.

4.3.2.3.5.3. Resource Uses

Under Alternative D, less land is open for wind-energy and mineral development than under Alternative A or C. This limited development could still adversely impact fuels management in terms of fracturing the landscape and making the use of prescribed fire extremely challenging and increasing the complexity of the burn. Wildland fire that is utilized to achieve resource benefits might be impossible in these situations. A beneficial impact could be the increased supporting road network associated with wind-energy and mineral development, which could be used strategically to break up the landscape when using prescribed fire to meet site-specific resource objectives. Other areas might also warrant fuels treatments, not to restore ecological health with fire or surrogate mechanical treatments, but simply to reduce fuel loading to protect human infrastructure.

Trails and travel management under Alternative D is similar to Alternative B, except that slightly fewer areas are closed to motorized travel. Use of existing roads and trails would be beneficial to fuels management, while seasonal restrictions for wildlife protection would be an adverse impact. The *Biological Resources* section addresses this in detail. Access to treatment areas and the use of existing roads for strategic breaks in prescribed fire and wildland fire that is utilized to achieve resource benefits is important to successful prescribed burning, and potentially the wildland fire that is utilized to achieve resource benefits.

Livestock grazing under Alternative D could be beneficial to fuels management objectives in the WUI because livestock grazing would reduce the fine fuels available in the event of a wildfire. Adverse impacts to the fire and fuels program under Alternative D would be similar to those under alternatives A and C. Alternative D would not result in the beneficial impacts of Alternative B, which allows for more residual grass in grazing allotments as a result of an overall more conservative livestock grazing strategy. Alternative B could allow for more extensive use of prescribed fire and allow for more successful reestablishment of desirable native herbaceous species after burns. The establishment of reserve common allotments also would result in a beneficial impact to fuels management under Alternative D. Reserve common allotments allow greater flexibility in treating and properly resting areas with prescribed fire, and may enhance the utilization of wildland fire to achieve resource benefits. In addition, under Alternative D, infrastructure projects would be the emphasis for range improvement projects, as under alternatives A and C, with fewer beneficial impacts than would result under Alternative B. Over the long term, this difference would likely result in some 20,000 fewer acres being treated than under Alternative B, which would have the same moderate to substantial adverse impact on the fire and fuels program as alternatives A and C.

4.3.2.3.5.4. Special Designations

Special designations would beneficially impact fuels management under Alternative D. Alternative D includes more acreage protections and stipulations that restrict disturbances in these areas than Alternative A and substantially more than Alternative C. The opportunity to manage historically natural landscapes under Alternative D would allow the restoration of areas using natural processes and emphasize treatments suitable for the landscape. Alternative D allows vegetative treatment and fuels management, where feasible, in ACECs such as Lander Slope, Red Canyon, and Green Mountain, where there are interfaces between communities that would benefit from prescribed fire and other fuels management treatments and ACEC stipulations.

Adverse impacts from Alternative D would include restrictions on the types of treatments that can occur if they do not directly complement wildlife habitat protected by the ACEC, such as in Green Mountain or East Fork. This would slow the restoration process in areas such as Green Mountain, where aspen communities are in poor ecological health and mountain shrub communities are decadent and dominated by late seral vegetation communities that might have already missed an historic fire return interval.

ACEC management under Alternative D, like Alternative B, could limit fuels treatment options if roads have been reclaimed to benefit the resource associated with the ACEC designation. A beneficial impact of ACEC management, such as in the South Pass Historic Mining Area ACEC, would be the objective of reducing fuels in the WUI. This would benefit fire management by reducing fuel loading and could allow for more effective protection of homes and valuable cultural resources in the event of a wildfire.

4.3.3. Stabilization and Rehabilitation

Under all alternatives, the need for stabilization and rehabilitation following a fire event is evaluated using an interdisciplinary approach to protect natural resources and threats to human health and safety. The guidelines for development of this plan are outlined in BLM Handbook H-1742-1, *Burned Area Emergency Stabilization and Rehabilitation*. BLM management of stabilization and rehabilitation does not vary by alternative so no analysis of impacts on this program is required. Additional information regarding the stabilization and rehabilitation programs is found in the *Stabilization and Rehabilitation* section in Chapter 3.

4.4. Biological Resources

4.4.1. Vegetation – Forests, Woodlands, and Aspen Communities

Management actions restricting forest management practices or contributing to the decline in abundance, distribution, or health of forests or woodlands, and availability, quality, and quantity of forest products are considered adverse impacts. Conversely, beneficial impacts include actions that enhance management, improve health, and protect and restore forests and woodlands in the planning area.

Direct impacts to forests and woodlands (forest products are a byproduct of and part of the following analysis of impacts to forest and woodland resources) result from management actions that affect forest structure, species composition/diversity, vigor, health, vegetative community type, or other forest/woodland characteristics. Management actions that limit timber availability, restrict timber extraction methods, and restrict areas where forest and woodland treatments can occur also have direct adverse impacts to forest products. Indirect impacts to forests, woodlands, and forest products include any change in forest and woodland characteristics as a result of natural forces (e.g., insect and disease and fire and drought), management actions for other resources, or failure to implement management actions.

Natural and human activities can produce beneficial and adverse impacts to forest and woodland communities (e.g., natural regeneration). In a mature forest or woodland, natural regeneration restores genetic diversity, sustained yield, and uneven-aged stands to benefit maintenance of a forest or woodland ecological site; ensures continuous production of forest products; facilitates insect and disease control; and produces economic benefits through proper land use, soil and water conservation, and eliminating the cost of planting. Alternatively, natural regeneration can introduce conifers into aspen stands, thereby reducing the size of or out-competing the aspen stands. See Map 47 for primary forest resource areas across the planning area.

4.4.1.1. Summary of Impacts

Alternative C results in the greatest projected total surface disturbance, followed by alternatives A (existing management), D, and B. Surface disturbance could result in adverse impacts by contributing to the decline in abundance, distribution, or health of forests and woodlands and the availability, quality, and quantity of forest products. Alternative C would allow the most motorized vehicle use and would result in the most new road construction, followed by Alternative A and then Alternative B. Motorized vehicle use could degrade forest health by disturbing soil and vegetation, leading to increased erosion. Motorized vehicle use could increase the risk of unplanned ignitions and provide access for unauthorized wood cutting. Alternative C, followed by alternatives A and B, implements the most silvicultural practices to actively manage forests and woodlands. More intense forest management practices could have a beneficial impact on forest and woodland health and forest products by increasing availability and reducing the risk of landscape-level stand replacement wildfires that occur naturally in forested areas in the planning area and are generally associated with forested stands that are not managed (historic conditions). Alternative C would result in the most beneficial impacts, from a silvicultural standpoint, to forests so long as management practices to increase forest product availability also improve forest health.

Alternative B provides the most forest and woodland landscape beneficial impact from a natural ecology standpoint in terms of emphasizing natural processes that dominate in these systems.

4.4.1.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The condition, species content, and vitality of the forest and woodland ecosystem are a function of the soils, topography, slope/aspect, and microclimate and climatic forces specific to the area.
- A complete forest or woodland inventory is available for only a portion of the planning area.
- Silvicultural treatments will be used to promote forest and woodland health, contribute to sustainable timber production, and enhance wildlife habitat value. Silvicultural treatments are considered long-term impacts. The use of clear-cutting varies by alternative.
- Vegetative treatments will vary in forest and woodland areas depending on the goals (e.g., fuel reduction in a WUI area) and the most appropriate treatment method.
- Aspen stands are generally in poor condition across the planning area due to limited seedling and sapling regeneration as a result of a number of factors, including ungulate browsing, conifer encroachment, and lack of recent fire disturbance.
- Stands managed for old growth will follow Healthy Forests Restoration Act of 2003 (Public Law 108-148) Section 102 for maintaining and managing these stands. There are limited areas managed for old growth features.
- Insect and disease mortality is a substantial concern in lodgepole pine and limber pine stands in the planning area. Accelerated salvage harvesting of the insect- and disease-killed trees is anticipated in the short term (years 1 through 10). Probable annual harvest levels and acreage disturbed in the years to follow (years 11 through 20) are anticipated to decrease as priority treatable areas are harvested.
- Forests and woodlands are important for watershed values, visual resources, and wildlife habitats. Some of these values are natural, some are sociological. For example, wildlife need habitats, not visual quality. Sociological, economic, and cultural influences of humans and must be considered in forest management.
- Mechanical forest treatments (soil erosion, etc.) could adversely impact water quality in the short term, but overall, the consequences of these treatments are anticipated to be negligible depending on treatment size and type.
- Management practices include removing encroaching conifers from aspen stands to release the stand and improve aspen stand health in some locations. Most woodlands (see "woodland" in the glossary) will continue in succession until disturbed by natural causes.
- Forest health, forest restoration, and hazardous fuels reduction objectives will be the major determining factors in forest management.
- Forested areas in the planning area are in fire regime groups III, IV, or V. Fire regime group III is defined as mixed severity with a return interval of 35 to 100 years; the Douglas fir stands are primarily in this fire regime group. The limber pine and juniper woodlands and the aspen forests/woodlands are in fire regime group III. The lodgepole pine and spruce-fir stands are in fire regime group IV, which is defined as an infrequent (return interval of 35 to 200 or more years) stand replacement fire. Therefore, clear-cut units approximating natural disturbance patterns are acceptable in established Wyoming BLM guidelines. Primary management options will emphasize thinning, removal of insects and diseases affecting trees, and partial overstory removals, where appropriate.

- Up to 700 acres of woodland (aspen, juniper, and limber pine) could be treated annually, which would assist in restoring woodlands to their historic place on the landscape and with rejuvenating aspen stands for wildlife, VRM, and the creation of natural fuel breaks.
- Public-demand sales for firewood, Christmas trees, posts and poles, and other forest products will continue. The actual number of permits issued and estimated volumes will vary annually based on public demand, although the trend is upward for over-the-counter permitted sales in the planning area based upon 2005–2009 totals and will not vary by alternative. There would be no new road construction to meet this demand. The volume of commercial forest product sales will not increase, will not vary across alternatives, and will depend on factors outside BLM management activities.

4.4.1.3. Detailed Analysis of Alternatives

Types of project impacts to forests, woodlands, and forest products under the alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to forests, woodlands, and forest products from surface-disturbing activities and proactive management actions are described under individual alternatives. Alternative C would result in the greatest projected total surface disturbance, followed by alternatives A, D, and B. Surface disturbance could result in adverse impacts by contributing to the decline in abundance, distribution, or health of forests and woodlands and the availability, quality, and quantity of forest products. Alternative C allows the most motorized vehicle use and would likely result in the most user-created new trails, followed by alternatives A, D, and B. Motorized vehicle use could degrade forest health by disturbing soil and vegetation, leading to increased erosion, and could increase the risk of unplanned ignitions and provide access for unauthorized wood cutting.

Alternative C, followed by alternatives A, D, and B, allows the most silvicultural practices to actively manage forests and woodlands. More intense forest management practices could have a beneficial impact on forest and woodland health and forest products by increasing availability and reducing the risk of landscape-level disturbances. Alternative C would result in the most beneficial impacts to forests, so long as management practices to increase forest product availability also improve forest health. However, funding for forest management practices is not likely to be available in sufficient amounts for these differences to result in anything more than minor differences in impacts among the alternatives. See the *Vegetation – Forests, Woodlands, and Aspen Communities* section in Chapter 3 for an explanation of the impact of reduced demand for forest products on forest management.

Forest management, including timber harvest, would contribute to improving overall forest health throughout the planning area. These types of actions would reduce the potential for landscape-level wildfires, and enhance age and species diversity. These specific proactive management actions common to all alternatives would result in beneficial impacts to forest, woodlands, and forest products by restoring historic processes, composition, and structures of forests and woodlands, and thereby maintaining a harvest level of forest products that supports these objectives.

4.4.1.3.1. Impacts Common to All Alternatives

Although the types of impacts to forest and woodlands under all alternatives are similar, the intensity of these impacts is expected to vary by alternative. The following paragraphs describe potential impacts common to all alternatives.

Air quality conditions in the area at the time of proposed forest and woodland treatments could restrict treatments to maintain air quality standards. These restrictions would result in potential short-term adverse impacts to vegetative treatments, such as planning and timing restrictions to minimize emissions associated with fugitive dust or smoke. Smoke dispersion is probably the most important concern and potential restriction of forest and woodland treatments involving fire.

Soil resource management can limit forest management options with restrictions on ground-disturbing activities when ground is frozen. In areas such as Dubois, where forested tracts are isolated and where primary forested stands are not restricted by seasonal wildlife closures, this could shorten the available time in any given year to complete forest treatments. Soil resource management can be beneficial to forest management by emphasizing protocol that reduces erosion and protects natural resources.

Fire and fuels management complements forest and woodlands management. A landscape-level approach to vegetation management and the over-the-counter sales of wood products to achieve fuels objectives would result in beneficial impacts to forest management by helping to restore these communities and reduce fuel loading and risk of long-term damage from landscape-level wildfire. The BLM does not anticipate that commercial sales would result in any more than a minor impact (adverse or beneficial) to forest health under any alternative.

INNS may adversely impact forest and woodland resources by altering fire behavior in these communities and leading to greater loss of habitat. This is notably the case in juniper and limber pine woodland areas infested with cheatgrass.

Short-term adverse impacts regarding the timing or location of vegetation treatments and the availability of forest products could result from temporary CSU restrictions and seasonal NSO restrictions in buffers for special status species and raptor nest sites in forests and woodlands.

Direct long-term adverse impacts to forest management will occur in localized areas where there are known and new significant cultural resource sites, because these sites would require protection and avoidance during forest and woodland management. The presence of cultural resource sites could restrict the location of vegetative treatments and access roads, thereby decreasing access and acreage available for forest and woodland treatments.

Oil and gas, wind-energy, and mineral development could adversely impact forest and woodland habitat by fragmenting forested stands and increasing the potential for human-caused fires and the spread of invasive species in these areas. These types of developments can also cause moderate to major disturbances and negate the beneficial impacts of some forest and woodland habitat treatments. The use of fire in these areas to restore forest and woodland habitat is more difficult than on an undeveloped landscape because of proximity to infrastructure and conflicts with resource uses. These types of resource developments can also reduce the acreage of forest and woodlands available for management.

Recreational use in forest and woodland areas could result in indirect short-term adverse impacts from unplanned ignitions and unauthorized woodcutting adjacent to permanent and dispersed camping areas. Unless properly designated and managed, development of recreation trails, both motorized and nonmotorized, could adversely impact forests and woodlands through increased soil erosion.

Potential impacts from VRM, NHTs and other historic resources, transportation, wildlife, and special status species are anticipated to influence the location, size, and shape of forest and woodland treatments and affect the locations and construction of access roads.

Seasonal restriction for forest and woodland management could apply to existing or newly designated ACECs and WSAs. Across all alternatives, the BLM will manage WSAs as natural areas where low-impact management tools are used to improve resource conditions, with no commercial removal of timber products. These impacts would be consistent across all alternatives.

4.4.1.3.2. Alternative A

4.4.1.3.2.1. Program Management

Approximately 1,500 acres per year of short-term disturbance over 20 years are anticipated from forest and woodland management (mechanical treatments and forest product sale areas) under Alternative A. All acres of this disturbance would be reclaimed.

Under Alternative A, forest and woodland resources are managed in response to conditions on the ground and objectives such as forest health, wildlife habitat requirements, and demand for forest products using a variety of silvicultural treatment types. Overall forest health is balanced with providing commercial and over-the-counter forest products to the public in a sustainable manner.

Clear-cuts of commercial forest stands (primarily used in lodgepole pine stands) are allowed on areas up to 25 acres in size, not within 100 feet of riparian-wetlands, and on slopes only up to 45 percent. Management is conducted in consideration of resource needs and demand for forest products, with forest product harvest objectives established for the Green Mountain and Lander Slope areas and on a case-by-case basis for the Red Canyon, South Pass, and Dubois areas. Timber and over-the-counter forest product sales would not exceed annual sustained yield capacity.

Forest replanting after timber sales or disturbance is on an as-needed basis. Similarly, management of forest insect and disease outbreaks is implemented on a case-by-case basis. Management and enhancement of aspen is emphasized in all forest management areas, while woodland species such as juniper and limber pine are not specified.

Alternative A does not apply an MLP for the Beaver Rim area and thus does not have special stipulations to protect unique plant communities in that area.

4.4.1.3.2.2. Resources

Under Alternative A, the BLM uses primarily mechanical treatments to maintain and enhance forest resources. Forest product sales are in response to local and regional market demand and on a case-by-case basis. Cut objectives are specified to allow harvest of timber on a sustained-yield basis, with the overall objective of improving forest health. As indicated in Chapter 3, sustainability could be difficult to ascertain with changing precipitation patterns and potential long-term climate change.

Management of soil resources under Alternative A could adversely impact forest management by restricting ground-disturbing activities on slopes over 25 percent, which could limit areas available for forest treatment if methods are determined to be ground disturbing. A notable example is in the Green Mountain area, where most of the forest resources are in the planning area. In the Green Mountain ACEC, more than 5,000 acres are on slopes in excess of 25 percent. Additional soil stipulations on reclamation could also adversely impact forest management by requiring soil stabilization on logging or treatment sites, which could make treatments cost more than the value of forest products harvested.

Full suppression of wildfires in forested and woodland areas is likely under Alternative A. This could be beneficial to forest resources by reducing the potential loss of timber resources and habitat from uncontrolled fire. This would result in short-term beneficial impacts to forested areas by limiting the short-term adverse impacts from high-severity fire on these areas. That could also include increased erosion and loss of residual trees to reestablish burned areas. Adverse impacts from this suppression approach would be continued loss of aspen due to lack of disturbance from fire, and long-term fuels buildup, which could lead to landscape-level and high-severity wildfires during the planning period as a result of years of full suppression of wildfires.

Riparian-wetland management under Alternative A restricts surface-disturbing activities within 500 feet of surface water. This could adversely impact forest management by restricting areas, but simple mitigation measures common to Wyoming Forest BMPs can be implemented to complete projects in these areas. Many of the projects in these areas would ultimately have beneficial impacts on riparian-wetland systems by restoring aspen communities and improving surface hydrology through the removal of younger-age-class conifers established in these areas as a result of altering the natural fire regime. The objective of progress toward PFC in riparian-wetland areas would be beneficial to forest management in many cases.

Management actions specific to wildlife and special status species could beneficially impact forests and woodlands if they restrict activities that could adversely impact forest and woodland health. An example of the beneficial impact of wildlife and special status species management to forest and woodland management is the restoration of aspen stands, which is beneficial to forest health and enhances wildlife habitat conditions.

Management actions specific to wildlife and special status species can also adversely impact forests and woodlands if they restrict forest management practices or timber product sales with seasonal closures, and individual species timing and distance stipulations that have the practical effect of limiting access to an area to a short period that makes sales impossible. Wildlife and wild/feral horse browsing in areas such as Green Mountain can adversely impact management of aspen stands.

4.4.1.3.2.3. Resource Uses

Under Alternative A, most of the planning area remains open to oil and gas and other minerals development, and the extent of RFD of minerals facilities is the second-greatest under this alternative. Where this potential development occurs in forest and woodland areas, it could adversely impact this resource by contributing to a decline in abundance, distribution, and health of forests and woodlands. The extent of most of the adverse impacts to forest and woodland resources would be greatest during the life of the development operation, with most areas of disturbance being reclaimed. Loss of forest and woodland areas as a result of oil and gas and mineral development is expected to be a long-term adverse impact; forest and woodland areas would not recover to predisturbance conditions over the next 20 to 30 years.

Most of the planning area is open to wind-energy development under Alternative A. Wind development could adversely impact forest and woodland resources by removal and fragmentation of these resources within a development site and supporting infrastructure. Similar to oil and gas and mineral development, wind-energy development in forest and woodland habitat would cause short-term and long-term adverse impacts.

Livestock grazing under Alternative A would have a continued adverse impact to aspen stands and, to a lesser degree, cottonwood galleries, due to browsing pressure on these woodlands. Intensive browsing pressure reduces the ability of these species to regenerate through suckering and contributes to the eventual die off of entire stands.

Alternative A permits the use of motorized vehicles on existing roads and trails in most of the planning area. The level of public access granted for motorized travel could adversely impact forests and woodlands by increasing the potential for unplanned ignitions and unauthorized woodcutting. However, allowing motorized vehicle use on existing roads and trails would also beneficially impact forest products by allowing access for commercial timber harvest and sales of over-the-counter wood products. Allowing motorized vehicle use in areas with limited travel designations would result in road and trail proliferation that would increase erosion, degrade vegetation, and increase the potential for unplanned ignitions in forest and woodland areas.

4.4.1.3.2.4. Special Designations

Special designations beneficially impact forests and woodlands if they place additional restrictions on activities that contribute to forest decline or degrade forest health (e.g., surface-disturbing activities and motorized vehicle use). For example, Alternative A restricts motorized vehicle use by limiting travel in some ACECs to designated roads, which would beneficially impact these areas by reducing the likelihood of unplanned ignitions and unauthorized forest and woodland product removal in these high-resource-value areas.

Special designations could adversely impact forests and woodlands and forest products with additional restrictions on forest and woodland treatments to maintain desired vegetative or habitat conditions or limit timber extraction availability or methods. ACECs with forest and woodland resources (Green Mountain, South Pass, for example) could also adversely impact forest and woodland management by limiting motorized travel to extract forest products or perform treatments, and seasonal closures that limit the time available to actively manage a forest or woodland landscape.

4.4.1.3.3. Alternative B

4.4.1.3.3.1. Program Management

Approximately 550 acres per year of short-term disturbance over 20 years are anticipated from forest and woodland management (mechanical treatments and forest product sale areas) under Alternative B. All acres of this disturbance would be reclaimed.

Under Alternative B, the BLM manages forests and woodlands for watershed stability, wildlife habitat, and forest health, with an emphasis on natural processes to achieve forest health objectives. Alternative B permits timber harvesting that mimics natural processes and addresses fuels loading in the WUI. Under this alternative, natural processes are emphasized and active management is used only where natural processes are unable to accomplish forest health goals or there is a threat to human health and safety. Alternative B allows for forest replanting after fire or treatment, but only when necessary for stabilization or to achieve desired forest habitat conditions.

Alternative B prohibits clear-cut-type forest treatments. The restriction on the use of clear-cuts under this alternative would beneficially impact forest woodlands management related to short-term maintenance of soil stability from lack of ground disturbance and maintenance of mature forest stands. The inability to use clear-cut forest management techniques could also be an adverse impact because that method of treatment can be used to mimic natural disturbance processes in lodgepole pine forests. The inability to break up forest fuel continuity could increase the threat of landscape-level disturbances, which could threaten municipal watersheds or adversely impact certain resource values.

Forest management actions under Alternative B could result in more mature stands with less diverse age structure, and could also result in an adverse impact in relation to other alternatives in terms of spread and extent of bark beetles and other forest and woodland pests, which are more prevalent in mature forest and woodland stands. Again, management under Alternative B emphasizes natural processes to achieve forest health, which raises the potential for landscape-level disturbances in forests and woodlands on BLM-administered lands in the planning area. This can result in a substantial adverse impact in terms of threatening human health and safety, the long-term removal of critical wildlife habitat types, affecting municipal watersheds, and encouraging the potential proliferation of nonnative species such as cheat grass after burns. A beneficial impact under this alternative would be the restoration of fire-dependent ecosystems.

Alternative B does not apply an MLP to the Beaver Rim area but instead closes it (and other areas of greater sage-grouse Core Area) to oil and gas leasing.

4.4.1.3.3.2. Resources

Under Alternative B, the BLM uses natural management to restore forest and woodland landscapes. Active management techniques would be used for specific concerns such as wildlife habitat and in the WUI. The use of wildland fires and prescribed burning to restore fire-adapted ecosystems would be the greatest restoration tool under Alternative B, and could substantially alter forest and woodland habitat in the planning area, because most forested areas are in fire regime IV or historically experienced stand-replacement fires. Woodland resources in the planning area are generally in fire regime III, or historically experienced mixed-severity fires. A likely result would be larger forested tracts in early seral condition as a result of fire. There would be only minor differences between the impacts under Alternative B management the impacts under Alternative A management.

Under Alternative B, a restriction on soil-disturbing activities on slopes over 15 percent is a major limitation on the ability to treat wildlife habitat or areas in the WUI. Water resource management under Alternative B would result in beneficial impacts to forest and woodland management because it emphasizes the development of watershed management plans that would be used to identify treatments to improve the ecological health of forest and woodland habitats. A major adverse impact under Alternative B would be restrictions on surface-disturbing activity within ¼ mile of surface water/riparian-wetland areas, which would limit the ability to manage forest and woodland types in these areas, notably the restoration of aspen stands in and adjacent to riparian-wetland areas.

Under Alternative B, management of the Little Red Creek Complex as non-WSA land with wilderness characteristics would have the potential to result in adverse and beneficial impacts. The Little Red Creek Complex is closed to motorized travel under Alternative B, which would beneficially impact forest resources by avoiding the adverse impacts of motorized travel. By managing the area to maintain wilderness characteristics, forest treatments that could improve forest health could be precluded.

Fire and fuels management under Alternative B complements forest and woodland management. The limitation on the use of heavy equipment in fire suppression would limit adverse impacts to forest resources in terms of short- and long-term impacts from soil erosion. Wildfire suppression tactics are more limited under Alternative B, except in the WUI or where fire threatens infrastructure, and this would enable a natural management approach where appropriate. Restoration of aspen with prescribed fire and wildland fire is greatest under this alternative and would help to regenerate aspen stands that are generally in declining health. However, the difference in impacts between Alternative B and Alternative A would be minor.

Wildlife and special status species management under Alternative B would restrict the timing when treatments can occur in critical winter range and elk parturition areas, and prohibit forest and woodland treatments within a 1.5-mile radius of active special status raptor nests. This would result in more adverse impacts to forests, woodlands, and forest products than Alternative A. However, wildlife and special status species management under Alternative B would generally complement forest and woodland resources because protections for wildlife species and their habitat is generally compatible with natural approaches to landscape management. Limitations on surface disturbance under Alternative B for the protection of greater sage-grouse would not be likely to adversely impact forest management because there is little overlap of sage-grouse habitat with forest units. However, Alternative B's closure of Core Area to oil and gas leasing would beneficially impact the unique plant communities in the Beaver Rim area more so than under Alternative A which protects only those communities located on slopes of 25 percent or more steepness.

Management actions under Alternative B for cultural resources, paleontological resources, and visual resources in relation to surface-disturbing activities would generally be beneficial to forest management. Protection of resources would emphasize naturalness of the landscape and promote management activities that mimic natural processes and landscape suitability. These guidelines could limit where treatments can occur, but also help to design treatments that are more acceptable to the public. There could be some adverse impacts in terms of restrictions on where treatments may occur and appearance on the landscape. An example is treatments in proximity to the Warm Springs Flume, where fire has not occurred for some time and the vegetation communities are in Fire Regime Condition Class II and III areas, or in areas with moderate to high departure from historic fire-return interval. In such cases, forest treatments could help to protect the cultural resource in the event of a wildfire.

4.4.1.3.3.3. Resource Uses

Alternative B restricts resource uses such as wind-energy and mineral development in the planning area far more than Alternative A. This would beneficially impact forest and woodland resources by reducing short- and long-term disturbance from such activities, moderating the amount of infrastructure and roads in these areas, which would reduce the potential for the use of fire in management, and increasing the potential for human-caused fires.

Under Alternative B, oil and gas development would result in 10,720 acres of short-term surface disturbance, a portion of which could adversely impact forests and woodlands by contributing to a decline in abundance, distribution, or health of these communities. Although most of the planning area remains open to mineral extraction under Alternative B, the RFD of minerals facilities is the smallest under Alternative B compared to the other alternatives. Most of the impacts would be temporary during the life of the operation, with most areas of disturbance being reclaimed following closure of operations; however, short-term adverse impacts from minerals development include forest health degradation and habitat fragmentation. Loss of forest and woodland areas as a result of oil and gas and mineral development would be a long-term adverse impact; forest and woodland areas would not recover to predisturbance conditions over the next 20 to 30 years.

Alternative B provides the greatest protection for aspen stands, although limited areas could still experience browsing pressure from livestock. Browsing pressure reduces the ability of these poplar species to regenerate through suckering and contributes to the eventual die-off of entire stands. Under this alternative, livestock grazing could beneficially impact aspen stands by implementing moderate grazing levels, which would allow aspen to avoid intensive browsing pressure. Alternative B would treat more acres of woodlands because little or no funding would be spent on rangeland improvement projects. Alternative B closure of the Sweetwater River pasture in the Silver Creek Allotment to livestock grazing would beneficially impact aspen and cottonwood woodland galleries in the riparian-wetland corridor.

Unlike Alternative A, Alternative B recreation management limits forest cutting in some RMZs. To the extent these restrictions preserve forest health, they could result in beneficial impacts. To the extent the prohibition limits silvicultural techniques that would improve forest health, they could result in adverse impacts.

Alternative B limits motorized vehicle use to designated roads and trails in most of the planning area, which would beneficially impact forest and woodland resources by reducing degradation of those areas from increased soil erosion. In addition, prohibiting cross-country motorized travel in areas with limited travel designations would eliminate the potential for new road and trail proliferation. Restricting motorized vehicle use to fewer travel routes could adversely impact forest products by limiting access for commercial and over-the-counter forest product harvest.

4.4.1.3.3.4. Special Designations

Special designations would beneficially impact forest and woodland management under Alternative B with additional acreage protections from surface disturbance in forested areas. The opportunity to restore forested areas using natural processes and emphasize treatments suitable for the landscape are greatest under Alternative B. Vegetative/silvicultural treatments and fuels management, where feasible, are allowed in ACECs such as the Lander Slope, Red Canyon, and Green Mountain, where the overlay of forest and woodland and ACEC management exist, although clear-cuts are not allowed anywhere under Alternative B. Forest management, however, could increase the likelihood of landscape-level fires to the extent that treatment is limited to that which would beneficially impact ACEC values.

Adverse impacts under Alternative B would result from restrictions on the types and timing of treatments. This would slow the restoration process in areas such as Green Mountain, where aspen communities are in poor ecological health. Another potential adverse impact of ACECs such as Green Mountain would be the adverse impact to aspen from wildlife grazing.

Alternative B manages the most waterways as eligible and suitable for inclusion in the NWSRS. This management precludes surface-disturbing activities within ¼ mile of the water course, which would beneficially impact forest resources in that area. However, silvicultural activities are also limited under Alternative B, with the potential for minor adverse impacts.

4.4.1.3.4. Alternative C

4.4.1.3.4.1. Program Management

Approximately 525 acres per year of short-term disturbance over 20 years are anticipated from forest and woodland management (mechanical treatments and forest product sale areas) under Alternative C. All acres of this disturbance would be reclaimed.

Alternative C manages forests and woodlands with the allowance to use all available tools and silvicultural techniques to provide forest products to the public and to maintain forest health. Clear-cuts are allowed to be any size and can be within 100 feet of riparian-wetlands. Ground-based logging activity can be on slopes up to 45 percent or on slope in excess of 45 percent with cable or helicopter logging. As opposed to Alternative B, active management under Alternative C would address issues such as insect and disease outbreaks across the forested landscape.

Like Alternative A, Alternative C does not apply an MLP for the Beaver Rim area and thus has no special management to protect unique forest and woodland areas.

4.4.1.3.4.2. Resources

Under Alternative C, although clear-cuts are allowed on slopes up to 45 percent under some circumstances, avoidance of soil-disturbing activities on slopes over 25 percent would adversely impact the ability to treat forest and woodland areas. This management is the same as Alternative A's protection of only those unique plant communities in the Beaver Rim area that are on slopes with 25 percent or more steepness.

Full suppression of wildland fire is most likely under Alternative C, and use of heavy equipment in fire suppression activities is authorized. Impacts to forest resources would be similar to those under Alternative A. This could be beneficial to forest resources by reducing the potential loss of timber resources and forest habitat from wildfire. In the short term, this would result in beneficial impacts to forested areas by limiting the short-term adverse impacts of high-severity fire on these areas. Adverse impacts from this suppression approach would be continued loss of aspen due to lack of disturbance from fire and long-term fuels build up, which could lead to landscape-level fire during the planning period as a result of years of full suppression tactics. The loss of soil seed bank and loss of A-horizon soils could adversely impact reestablishment of forests and woodlands after high-severity fires.

A beneficial impact under Alternative C would be the lessening of restrictions on surface-disturbing activities within 500 feet of riparian-wetlands. This could allow logging in riparian-wetland corridors, where greater restrictions would prohibit such activities. Active management in riparian-wetland areas complements forest and woodland management under Alternative C.

Forest management actions under Alternative C could result in less-dense stands with more diverse age structure, and therefore would result in the most beneficial impacts by slowing the spread of bark beetles compared to alternatives A and B. Precommercial thinning could also have a beneficial impact on forests and woodlands, if performed at the appropriate intensity, to reduce fuels and the chance of landscape-level disturbances.

Management actions under Alternative C designed to protect wildlife and special status species habitat from the adverse impacts of surface-disturbing and surface-disruptive activities would be similar to those under Alternative A. Adverse impacts to forest and woodland and forest product management would result from limits on access to forest areas due to seasonal closures and distance limitations around active raptor nests, but these impacts would be expected to be minor and not preclude treatment. Beneficial impacts would result from maintenance of the road network inside and outside big game critical winter range and parturition areas. This would allow access to forested areas and facilitate treatments and forest product sales.

Clear-cuts are allowed under Alternative C, within some parameters, which would result in greater forest product availability than Alternative B, but similar to Alternative A. The potential adverse impacts to microclimates or regeneration time and soil erosion would be greater than under Alternative B, but similar to Alternative A.

Although management under Alternative C for cultural, paleontological, and visual resources would limit surface-disturbing activities and treatment techniques to maintain viewsheds, prescriptions under Alternative C are generally the least restrictive of all the alternatives and allow for the greatest flexibility in forest and woodland management. Under this alternative, there would be some adverse impacts from cultural, paleontological, and visual resources management, with beneficial impacts from VRM in terms of helping to design the treatments to be most acceptable to the public.

4.4.1.3.4.3. Resource Uses

Under Alternative C, most of the planning area is open to oil and gas and other minerals development, and the extent of the RFD of minerals facilities is the greatest under this alternative. A minor portion of this potential development could adversely impact forests and woodlands by contributing to a decline in abundance, distribution, or health of forests and woodlands. The extent of some of the impacts would be temporary during the life of the operation, with most areas of disturbance being reclaimed following closure of operations; however, short-term adverse impacts from oil and gas and mineral development include forest health degradation and habitat fragmentation. Loss of forest and woodland areas as a result of oil and gas and mineral development would be a long-term adverse impact because forest and woodland areas would not recover to predisturbance conditions over the next 20 to 30 years.

Most of the planning area is open to wind-energy development under Alternative C. Wind-energy development could adversely impact forest and woodland resources by removal and fragmentation of these resources within a development site and supporting infrastructure. Wind-energy development in forest and woodland habitat would result in both short-term and long-term adverse impacts.

Livestock grazing under Alternative C would result in a continued adverse impact to aspen stands and, to a lesser degree, cottonwood galleries, due to browsing pressure on these woodlands. Browsing pressure reduces the ability of these poplar species to regenerate through suckering, and contributes to the eventual die off of entire stands. Adverse impacts to forest resources from livestock grazing would be minor compared to Alternative A and moderate compared to Alternative B, depending on grazing strategies implemented in forest resources. Like Alternative A, Alternative C does not close the Sweetwater Canyon pasture to livestock grazing, so adverse impacts to woodland vegetation in the canyon would be the same.

Alternative C permits the use of motorized vehicles on existing roads and trails in most of the planning area. The level of public access granted for motorized travel could adversely impact forests, woodlands, and forest products by increasing the potential for unplanned ignitions, unauthorized woodcutting, and INNS spread. However, allowing motorized vehicle use on existing roads and trails would also beneficially impact forest products by allowing access for commercial and over-the-counter forest product harvest. Allowing cross-country motorized travel in areas with limited travel designations would result in road and trail proliferation that would increase erosion, degrade vegetation, and increase the potential for unplanned ignitions, which would adversely impact forests, woodlands, and forest products.

4.4.1.3.4.4. Special Designations

Alternative C does not designate any ACECs and manages Congressionally Designated Trails with a ¼-mile buffer. Areas specially designated under alternatives A and B are managed under Alternative C with standard stipulations. Accordingly, to the extent that special designations could beneficially impact forests and woodlands by placing additional restrictions on activities that contribute to forest decline or degrade forest health (e.g., surface-disturbing activities and motorized vehicle use), Alternative C would result in more adverse impacts than alternatives A and B. To the extent that management of special designations limits forestry activity, Alternative C would result in beneficial impacts because it includes no such special management.

Under Alternative C, there would be some adverse impacts to forest resources from applying standard stipulations. For example, no part of Green Mountain is designated an ACEC, but seasonal restrictions are still applied. Seasonal restrictions would result in adverse impacts from restricting access to forest areas for management if the season in which to undertake forest management is too restricted to be able to complete needed work.

Under this alternative, the lack of management protections associated with special designations could also adversely impact forest and woodland resources and lead to increased adverse disturbances from recreational use and resource development in these habitat types and cause degradation of forest and woodland resources.

4.4.1.3.5. Alternative D

4.4.1.3.5.1. Program Management

Approximately 600 acres per year of short-term disturbance over 20 years are anticipated from forest and woodland management (mechanical treatments and forest product sale areas) under Alternative D. All acres of this disturbance would be reclaimed within a short time. These approximate annual acres treated over 20 years are greater than under alternatives A and B, but less than anticipated under Alternative C.

Alternative D manages forests and woodlands using all available tools and silvicultural techniques to provide forest products to the public and to maintain forest health. Clear-cuts are allowed to be any size and in any location, depending on resource conflicts. This management would result in more beneficial impacts to forest and woodlands management; it does not impose artificial limits on forest management but acknowledges the potential for resource conflicts such as the potentially adverse impact of clear-cuts to soil and riparian-wetland areas.

Alternative D applies an MLP for the Beaver Rim area which would provide beneficial impacts to forests and woodlands.

4.4.1.3.5.2. Resources

Under Alternative D, slope avoidance would result in slightly more adverse impacts to the ability to treat forest and woodland areas than under Alternative A or Alternative C, but less than under Alternative B.

Full suppression of wildland fire is more likely under Alternative D than Alternative B, but less likely than under alternatives A and C. The use of heavy equipment in fire suppression activities is authorized after considering impacts to other resources. Beneficial impacts to forest resources would be similar to those under alternatives A and C by reducing the potential loss of timber resources and forest habitat from wildfire. In the short term this would have a beneficial impact on forested areas by limiting the short-term adverse impacts from high-severity fire in these areas. Adverse impacts from this suppression approach would continued loss of aspen due to lack of disturbance from fire and long-term fuels build up, which could lead to landscape-level fire during the planning period as a result of years of full suppression tactics. The loss of soil seed bank and loss of A-horizon soils could adversely impact reestablishment of forests and woodlands after high-severity fires. The differences in impacts among the alternatives with regard to fire suppression activities would be very minor.

Alternative D, like Alternative A, restricts surface-disturbing activities within 500 feet of riparian-wetlands. This would result in more adverse impacts to forest and woodlands management than Alternative C, which could allow logging in riparian-wetland corridors where greater restrictions would prohibit such activities. Alternatives A and D would result in fewer adverse impacts than Alternative B.

Forest management actions under Alternative D are comparable to alternatives A and C in allowing the use of silvicultural techniques to address beetle outbreaks in manageable areas and create diverse age structure by allowing precommercial thinning and other forest treatment methods. Under Alternative D, funding to implement effective landscape-level treatments to address loss of dominant forest and woodland species such as lodgepole pine and limber pine could continue to be limited and substantially limit the beneficial impact of such treatments. Management actions under Alternative D designed to protect wildlife and special status species habitat from the adverse impacts of surface-disturbing and surface-disruptive activities would be similar to those under Alternative B, but to a lesser extent. Adverse impacts to forest and woodland and forest product management would be limits on access to forest areas due to distance limitations around active raptor nests. Seasonal closures due to wildlife and travel management concerns could also adversely impact forest management in areas that have inclement weather by limiting the season of treatment to too short a time before inclement weather makes access impossible. Beneficial impacts would be maintenance of road networks inside and outside big game critical winter range and parturition areas. This would allow access to forested areas and facilitate treatments and forest product sales.

Clear-cuts are allowed under Alternative D, with consideration of other resources, which would provide greater forest product availability than Alternative B, but similar to alternatives A and C, and potentially more beneficial impact because Alternative D does not impose artificial constraints such as slope or size. Potential adverse impacts to microclimates or regeneration time and soil erosion would be greater than under Alternative B, but similar to alternatives A and C.

Management of the Little Red Creek Complex for wilderness characteristics would result in generally the same impacts under Alternative D as Alternative B – in some ways beneficial and in some ways adverse.

Management under Alternative D for cultural, paleontological, and visual resources limits ground-disturbing activities and treatment techniques to maintain viewsheds. This management is the second most restrictive of all the alternatives and allows the least flexibility in forest and woodland management. Under this alternative, there would be some adverse impacts from cultural, paleontological, and visual resources management, although fewer impacts than under Alternative B. Forest treatments can be designed to reduce contrast by feathering and avoiding straight lines, which would limit adverse impacts to forest, and particularly woodlands, management (where feathering has been very effective).

4.4.1.3.5.3. Resource Uses

After Alternative B, Alternative D management of oil and gas and other minerals development would result in the next most beneficial impacts to forest and woodlands management by closing the most areas to leasing (and withdrawals from locatable minerals) and managing the most areas as NSO. In the Dubois and South Pass Primary Forest Resource areas, this management would be substantially more beneficial than that under alternatives A and C. Although the Green Mountain ACEC is open to mineral location under Alternative D, a Plan of Operations is required for disturbances under 5 acres, which would assist the BLM in preventing undue or unnecessary degradation to forest resources (see *Special Designations*). Alternative D has almost as beneficial impacts to the forest resources in the proposed expanded ACEC as Alternative B because oil and gas leases in the expanded Green Mountain ACEC would be NSO.

Alternative D's MLP for the Beaver Rim area would have a beneficial impact on the area's unique plant communities that is similar to Alternative B's protections by making oil and gas in those areas subject to an NSO stipulation. This is more beneficial than under alternatives A and C where only the standard steepness stipulation protects the plant communities.

Except for Alternative B, Alternative D allows the least wind-energy development, followed by alternatives A and C. Wind-energy development could adversely impact forest and woodland resources by removal and fragmentation of these resources within a development site and supporting infrastructure. Alternative D wind-energy development in forest and woodland habitat would result in short- and long-term adverse impacts. This could be a major adverse impact, especially in woodland areas that might be suitable for wildland fire utilization and could also raise the cost of forest management as it increases the impetus for WUI management.

Livestock grazing under Alternative D would result in a continued adverse impact to aspen stands and, to a lesser degree, cottonwood galleries, due to browsing pressure on these woodlands, but the impact would be less than under Alternative C. Browsing pressure reduces the ability of these poplar species to regenerate through suckering and contributes to the eventual die-off of entire stands. In terms of areas closed to livestock grazing, Alternative D closes slightly more acres to livestock grazing, but none containing aspen or cottonwood galleries; therefore, this impact would be the same as under Alternative A and less beneficial than under Alternative B, which includes management that would beneficially impact the woodlands in the Sweetwater Canyon pasture. Alternative C has more potential for adverse impacts to woodlands because of the potential for adverse impacts from intensive grazing strategies. These would be similar to the adverse impacts described for grassland and shrubland communities.

Alternative D closes almost the same number of acres to motorized vehicle use as Alternative B, including some in Primary Forest Management Areas, and manages to reduce duplicative roads. The level of public access granted for motorized travel could adversely impact forests, woodlands, and forest products by increasing the potential for unplanned ignitions, unauthorized woodcutting, and invasive species spread. However, allowing motorized vehicle use on existing roads and trails could also beneficially impact forest products by allowing access for commercial and over-the-counter forest product harvest.

4.4.1.3.5.4. Special Designations

Special designations under Alternative D would be beneficial impacts to forests and woodlands if they place additional restrictions on activities that contribute to forest decline or degrade forest health (e.g., surface-disturbing activities and motorized vehicle use). Alternative D manages 51,196 acres of forest and woodlands (Primary Forest Resource Areas) in the Lander Slope, Red Canyon, Whiskey Mountain, Beaver Rim, East Fork and Green Mountain areas as ACECs and other areas with forest and woodland ecological sites as special management areas. Limits on surface disturbance and other management in these areas would be a beneficial impact by reducing the likelihood of unplanned ignitions and unauthorized forest and woodland product removal in these high resource value areas. ACEC designation also requires that mining operations less than 5 acres file a Plan of Operations, which gives the BLM an opportunity to ensure that no undue or unnecessary degradation would result. While a Plan of Amendment would not preclude mining development, it could avoid exploratory activities that would result in long-term adverse impacts to forest and woodlands management. Potential adverse impacts under Alternative D would be restrictions on forest and woodland treatments in maintenance of special designation objectives and restrictions on season when treatments may be implemented.

Management of Congressionally Designated Trails under Alternative D would result in more beneficial impacts to forest and woodlands management than under any alternative other than Alternative B by limiting the amount of surface disturbance and applying stricter VRM in areas within view of the trails. This could be an adverse impact to forest and woodland management by restricting treatment methods and project design. However, due to the limited overlap of forest resources with the trails management area, this adverse impact could be minor.

Under Alternative D, fewer waterways are managed as eligible and suitable for inclusion in the NWSRS than under Alternative B, so there would be fewer beneficial impacts. However, Alternative D management would result in far fewer adverse impacts than Alternative C, and somewhat fewer adverse impacts than Alternative A.

Alternative D's management of the parturition areas that are part of the expanded ACEC in Alternative B is open to oil and gas leasing but subject to an NSO. This would beneficially impact forest resources that would otherwise be adversely impacted through oil and gas surface disturbance. This management would avoid most of the adverse impacts identified under alternatives A and C but would not achieve the beneficial impacts from better management using oil and gas created roads. It is unlikely that road development for forest management would not occur on its own to reach moderate- to low-value timber stands.

4.4.2. Vegetation – Grassland and Shrubland Communities

Most biological resources in the planning area are dependent on the quality and quantity of vegetation. This section describes potential impacts to grassland and shrubland communities from resource management actions and resource use programs.

Adverse impacts to grassland and shrubland communities result from surface-disturbing activities and other activities that cause vegetation to be removed or that mechanically impact plants. Livestock grazing, wildlife use, wildfire, and vegetative treatments result in direct adverse impacts to these plant communities. Impacts to grassland and shrubland communities result from activities that alter the health of the communities. Erosion and a change in hydrology, or encroachment of invasive species, are indirect impacts. Changes beneficially impact some vegetation species and adversely impact others. Plant succession is the product of opening and filling niches on the landscape. Beneficial impacts to grasslands and shrubland communities are measured against objectives for the ecological site. It is desirable that grassland and shrubland communities are maintained with a mix of species composition, cover, and age classes.

Beneficial changes could be a reduction in the spread of invasive species or the implementation of vegetative treatments that improve these communities. Adverse changes would include shifts to less desirable native species or increases in bare ground. The primary objective in sagebrush grassland vegetation communities is a vigorous stand of sagebrush with an understory containing cool-season bunchgrasses such as needle and thread, Indian ricegrass, bluebunch wheatgrass, green needlegrass, and bottlebrush squirreltail. These large cool-season bunchgrasses are replaced by smaller, more grazing-resistant species such as threadleaf sedge, Sandberg bluegrass, and rhizomatous wheatgrasses when subjected to heavy or repeated use during the critical growing season.

FLPMA and the Wyoming Standards for Healthy Rangelands direct the BLM to manage vegetation resources toward the maintenance and/or restoration of the physical function and biological health of these communities. The objectives are to maintain and improve the condition and trend of these plant communities within their respective ecological site. This would provide benefits to the many consumptive and non-consumptive uses within these sites. Examples include beneficial impacts to livestock grazing, wildlife habitat, recreation, and soil and water.

4.4.2.1. Summary of Impacts

Adverse impacts to grassland and shrubland communities accrue in two fundamental ways. Vegetation can be lost, or plant communities composition can shift. All alternatives entail surface-disturbing activities that remove vegetation. Alternative C entails the most surface disturbance, followed by alternatives A, D and B. All alternatives provide for reclamation activities which are projected to be successful, except in isolated circumstances. However, while reclamation activities normally replace vegetation cover, reclaimed areas are commonly dominated by herbaceous plant communities, especially in the near and mid-term. Consequently shrub communities, notably sagebrush, would decline at volumes commensurate with the amount of surface-disturbing activity each alternative allows. In the long term shrubs will eventually colonize these sites.

Herbivory by livestock, wildlife and wild horses can change the vegetation community composition to species that are more adapted to utilization pressure. Communities in the planning area can remain stable for extended periods, but can also undergo transition to when conditions alter the niches occupied by the vegetation. The primary issue relates to vegetation community transition when grazing or browsing is heavy, or occurs repeatedly during rapid growth periods. Generally, plants are more vulnerable to damage from herbivory during this period. It is not anticipated that any of the alternatives will materially affect the way wildlife and wild horses utilize the range. Consequently no large scale changes in vegetation are expected to occur from these uses. All alternatives address the need to protect the vegetation resource from issues associated with livestock grazing. Alternative B provides for plant health primarily by limiting the levels of use. Alternative C relies on strategies that control the timing of grazing use. Alternative D provides a hybrid of the approaches from alternatives B and C. Alternative A, allows for any strategy, but provides little direction regarding preferred approaches. All alternatives offer the potential to promote healthy plant communities, but the more aggressive strategies associated with Alternative C offer the most risk.

Some disturbances and vegetation treatments can alter niches in a manner that promotes vegetation health and moves plant succession toward desired plant communities. All alternatives provide the opportunity for treatments that augment natural disturbance, such as drought and insect infestations, that can influence plant succession.

Successful reclamation and grazing management provides a deterrent to INNS because healthy plant communities successfully compete with INNS for space in the landscape. This is the most important component of a comprehensive INNS strategy, and all alternatives provide for this need. However the more aggressive nature of Alternative C again provides the most risk. In some situations INNS invade native range even though the native plant community is healthy. In this situation, physical treatment of infestations is required, and all alternatives provide for this activity. Control of INNS is not assured under any alternative.

4.4.2.2. Methods and Assumptions

The Wyoming Standards for Healthy Rangelands are designed to maintain or improve rangeland health and are applied under all alternatives. Theoretically, all lands in the planning area are required to meet the Standards for Healthy Rangelands. However, cause-and-effect relationships associated with vegetation are complex. It is much easier to identify areas not meeting the Wyoming Standards for Healthy Rangelands than to identify causal factors and site-specific solutions, which are often the subject of dispute. Consequently, assessments of rangeland health require detailed analysis, and decisions often require monitoring data that is time consuming and expensive to obtain. In many cases, implementation of BMPs that are generally successful would leave some problem areas unaddressed. Consequently, achieving the Wyoming Standards for Healthy Rangelands is an ongoing process. The BLM would purse rangeland health objectives throughout the planning period under all alternatives.

Methods and assumptions used in this impact analysis include the following:

- Energy development is identified as the primary source of surface disturbance in the planning area.
- Grazing and browsing, whether by livestock or wildlife, must be properly managed to maintain the health of grassland and shrubland communities and to improve the communities' capacity to sequester carbon. Improper livestock grazing management can decrease plant vigor and ground cover, lead to increased erosion, degrade soil nutrients and water retention, and adversely impact rangeland health. As rangeland health degrades, its ability to hold carbon is reduced.

- As rangelands are evaluated through assessments, guidelines are implemented to improve undesirable conditions regardless of allotment category. Over time, implementing guidelines is expected to continue to improve and maintain the health of these communities.
- Fire plays an intricate role in these communities, particularly shrubland communities. Prescribed fire is a tool used to manage vegetative communities and can result in short-term adverse impacts, but long-term beneficial impacts to wildlife and wildlife habitats.
- Both wildland and prescribed fire result in adverse and beneficial impacts to grassland and shrubland plant communities. In the short term, fires result in the direct loss of vegetation, habitat, and forage, an increase in soil erosion, and reduced water penetration, and create a seedbed for invasive species. However, the long-term result can be beneficial. Fire has played a historic role on the landscape. On a landscape level, fire can rejuvenate plants, increase density and cover of vegetation, increase diversity, change plant composition to more desirable states, and enhance the overall health of vegetative resources. In shrublands, fire can have the long-term impact of reducing shrubs from the population for up to 30 years. This might or might not be beneficial, depending on the desired use of the area, which is determined by other management decisions such as in the livestock grazing or special status species programs. Limiting the effects or spread of fire prevents direct loss of vegetation that can be used by livestock, wild horses, and wildlife. Extinguishing fires immediately also reduces the invasion of invasive species by not offering a seedbed to easily germinate in without competition. Given fire's historic role on the landscape, the lack of fire plays a direct role in the health of grassland and shrubland communities. The alternatives vary in the extent to which wildland fire would be suppressed. It is not possible to quantify these impacts.
- Increased prescribed fire would result in a short-term adverse impact to vegetation, but a long-term beneficial impact. The duration of the impact (both adverse and beneficial) would depend on the type of vegetation community. Beneficial impacts in shrubland communities might not be observed during the planning period. Thus, the extent to which prescribed fire is used, which varies by alternative, determines the degree of adverse and beneficial impacts.
- Surface disturbance adversely impacts grassland and shrubland communities by contributing to a decline in abundance, distribution, or health of the vegetation. In addition, surface disturbance contributes to fugitive dust. Dust from increased road construction, well pads, and ROWs that accumulates on the surface of plant leaves would adversely impact the plants. Photosynthesis and the plant's ability to function are greatly reduced in areas adjacent to these projects. As acres of disturbance increase, the chances of successful reclamation in these areas decreases. Thus, the surface disturbance the more adverse impacts to grassland and shrubland communities.
- Adverse impacts to vegetative communities from INNS management would relate directly to the amount of surface disturbance. The more authorized surface disturbance, the more adverse impacts to vegetative communities.
- Short-term impacts to plant communities result from activities that contribute to the decline in the distribution or abundance of the plant communities within 5 years of the activity. Short-term impacts to vegetation can also depend on the time it takes for a disturbed area to become revegetated, generally 1 to 5 years.
- Long-term impacts are those that require more than 5 years to manifest or that persist for more than 5 years. Some existing plant communities likely would not be reestablished to predisturbance structure and density for more than 20 years, regardless of the cause of the disturbance.

4.4.2.3. Detailed Analysis of Alternatives

4.4.2.3.1. Impacts Common to All Alternatives

Potential impacts to grassland and shrubland plant communities would be similar under all alternatives, but the extent and intensity of impacts would vary by alternative. Impacts to grassland and shrubland communities from livestock and wildlife grazing and browsing, recreation use, fuels management, prescribed fire and wildfire, and proactive management actions are described under the each alternative. The following paragraphs described potential impacts common to all alternatives.

Vegetation and soils have a symbiotic relationship: any adverse impacts to the soil resource can directly impact the health and functionality of the vegetation. Impacts from water and wind erosion and other forms of surface disturbance can reduce the soil's capability to provide an environment that supports vegetation. A healthy soil resource will promote healthy vegetative attributes.

Activities that disturb the surface occur under all alternatives. Under all alternatives, programs apply BMPs for surface-disturbing activities. These disturbances can impact grasslands and shrublands by contributing to the transport of invasive species along the network of roads and watersheds. Plant communities can be degraded, lost, and fragmented by such activities as fire and fuels management, livestock, wild horse, and wildlife herbivory, recreation use, road and ROW construction, and minerals development.

Livestock, wild horse, and wildlife herbivory produces both adverse and beneficial impacts to grasslands and shrublands, depending on the intensity, timing and season of use, condition of the range, and precipitation patterns. Herbivory can result in direct mortality to native plants of grasslands and shrublands through trampling and direct consumption of the plants. There could be indirect impacts due to soil compaction and erosion, and changes in plant community composition that cause plant communities to change to different transitional states.

Sagebrush communities in the planning area contain a shrub and herbaceous component. Impacts associated with grazing refer to herbivory on the herbaceous component, whereas browsing refers to herbivory on the shrub component. Cattle, wild horses, elk, and bighorn sheep are primarily grazers. Pronghorn and mule deer are grazers in some seasons, especially spring, and browsers in others, especially winter. Moose utilize sagebrush and grassland habitat periodically but not in sufficient numbers to be an important driver affecting plant succession.

Livestock grazing is permitted on more acreage in the planning area than any other resource use with the potential to impact grasslands and shrublands. Grasslands and shrublands evolved with grazing, but in historic distributions and uses different than today's commercial grazing operations. Historically, grazing has resulted in adverse impacts. Over the last 50 years, rangeland conditions in the planning area have improved with the application of better grazing management practices. With proper grazing management, many plant species will have increased plant vigor or increased seed production — but improperly managed grazing could result in reduced root growth, which is where long-term carbon sequestration can be maximized.

However, areas where rangeland health is most likely to experience adverse impacts are areas where livestock congregate. These include areas with water, shade, aspect, and/or more palatable forage. Rangeland improvement projects can adversely impact grasslands and shrublands by concentrating livestock along fence lines, water developments, and salt and mineral supplementation. Fencing to protect riparian-wetland areas can disperse livestock to upland range that has historically not been heavily grazed, with the potential for adverse impacts to grasslands and shrubland communities. The numbers of range improvement projects vary by alternative; therefore, potential adverse and beneficial impacts to grassland shrubland communities from range improvement projects vary by alternative.

Rangeland management often is geared toward improving the overall distribution of livestock within an allotment. This is accomplished through implementing BMPs, such as managing utilization levels and the timing of utilization. In the absence of BMPs, livestock use increases bare ground and promotes shifts in plant communities that are adverse. Grazing-resistant species such as blue grama, threadleaf sedge, and western wheatgrass tend to reproduce through rhizomes rather than seeds, and exhibit low profiles that limit the level of use by livestock, which produces long-term adverse impacts to the site.

Improper livestock grazing management can transport and cause the propagation of INNS.

Through proper and sound grazing management, livestock grazing can beneficially impact rangeland health by improving plant vigor, increasing vegetative cover, reducing competition among plant communities, and reducing INNS infestations.

One tool used to decrease the spread of invasive species in an area is to have livestock graze an invasive species at a crucial point in its life-cycle. For example, sheep can graze leafy spurge before seed distribution and cattle can graze areas infested with the annual grass cheatgrass in early spring before boot formation, thereby limiting seed production. However, the use of livestock for this purpose is expensive and requires a long-term commitment. It also has the potential to adversely impact vegetative resources by reducing ground cover and making the area vulnerable to new INNS infestation. In the planning area, only oil and gas operators have implemented this potentially beneficial practice on state and private lands; there has been no application of this practice on public lands.

Long-term over utilization or repeated grazing in the critical growing season reduces abundance of certain native plants, allows less desirable forage species to increase, and allows INNS to enter and, in some cases, dominate communities. An indirect impact of improper livestock grazing management is a decrease in ground cover, which results in an increase in runoff and soil erosion, which can impact the health of the grassland and shrubland plant community. These adverse impacts can be both short and long term and can move a plant community to a new ecological state that cannot be reversed.

The presence of riparian-wetlands can adversely impact grassland and shrublands because they attract high levels of grazing use. Sagebrush grasslands in the immediate vicinity of riparian-wetlands tend to be heavily used. Trampling of, use of, and mechanical damage to plant species impact grasslands and shrublands.

Wildlife grazing and browsing can result in both adverse and beneficial impacts to the health and productivity of grassland and shrubland communities. During severe winters, wildlife can congregate on winter ranges and over use grasses and shrubs. This over use typically occurs after livestock have grazed the area during their grazing season. In addition to areas of congregation, wildlife movement can transport and propagate invasive seeds and plant parts, thereby expanding infestations. Impacts to vegetation by these means of transport have contributed to the challenge of managing rangeland health and productivity in the planning area. Impacts from wildlife exceeding objective levels can result in an adverse impact to grassland and shrubland communities in terms of use.

Wild-horse numbers are managed according to the established appropriate management level for a herd area. When horse populations increase, plants can be over used, which adversely impacts the vegetative health of the plant community. Unregulated wild-horse numbers can adversely impact plant vigor and health by year-round consumption in grassland and shrubland communities. A beneficial impact from wild-horse grazing is that within proper appropriate management level levels, wild horses tend to use higher-elevation areas and graze farther from water. This type of grazing achieves reduced pressure on grasslands and shrublands.

Continued proper management of programs that impact grassland and shrubland communities would maintain the species attributes using ecologically sustainable practices that would enhance or maintain these communities in accordance with each site's ecological site description.

ROW corridors adversely impact grasslands and shrublands. These corridors are typically a linear disturbance that bisects an area. Vegetation is removed for project installation. This immediate loss of plants is a short-term adverse impact. However, the long-term adverse impact of linear disturbances is that these areas are difficult to reclaim. The linear nature of the disturbance does not readily allow for fencing and protection of the site.

Under all alternatives, no surface disturbances, permanent new development, or ROWs are allowed in WSAs. Therefore, impacts to grasslands in WSAs do not vary by alternative and are not be further analyzed.

All alternatives limit motorized vehicle use to existing and/or designated roads and trails with seasonal travel limitations in certain areas; the locations vary by alternative. Adopted for the benefit of wildlife, these limitations also beneficially impact plant communities because they limit the likelihood of people driving cross-country because of weather and/or road condition. Where present, seasonal limitations beneficially impact grassland and shrubland communities.

Alternatives B and D have protective management for the unique plant communities in the Beaver Rim area while alternatives A and C have only the standard steepness slope limitations, which is less beneficial. However, the unique plant communities are primarily forest and woodland types which are analyzed in that section. The Beaver Rim area management has such slight differences in impacts that no additional analysis is required.

4.4.2.3.2. Alternative A

4.4.2.3.2.1. Program Management

Under Alternative A, there are no requirements for the use of weed-free seed and no restrictions on the use of mulch and hay that could introduce invasive species. Alternative A manages grasslands and shrublands to the ecological site and the transitional state they are in. Beneficial impacts to grassland and shrubland health occur under Alternative A to varying degrees through managing for objectives based on ecological site descriptions. Vegetative treatments such as prescribed fire and mechanical, chemical, and biological treatments are used to improve plant community health, diversity, cover, and other attributes to meet resource objectives.

4.4.2.3.2.2. Resources

Alternative A management of air resources places moderate limitations on surface disturbance; therefore, it would neither beneficially nor adversely impact grasslands and shrubland plants. Alternative A management of soil and water resources would beneficially impact grassland and shrubland plants by limiting surface disturbance. Lands with wilderness characteristics are not specially managed under Alternative A, so there are no limits on surface disturbance. In general, wildfires are suppressed, although on a case-by-case basis. Therefore, the beneficial and adverse impacts from fire management are site-specific.

The BLM currently manages activities to reduce the invasion of INNS. Under Alternative A, appropriate methods, herbicide types, and applications are used in grasslands and shrublands to control INNS, with beneficial impacts to vegetation.

Alternative A places moderate limitations on surface disturbance for the benefit of wildlife. This alternative closes ¼ mile around greater sage-grouse leks to surface disturbance. This would beneficially impact grasslands and shrubland resources, except to the extent that it would preclude vegetation treatment that would otherwise benefit the vegetative community, especially shrublands.

In areas protected for cultural, paleontological, and visual resources, grassland and shrubland plants tend to achieve full growth and maximize their vigor. This allows plants to always remain in a healthy state in their area of protection. However, the acreage of these sites is small and mostly less than 100 acres (exclusive of VRM management). The exception is the Warm Springs Canyon Flume, which under this alternative is open to grazing and construction of range improvement projects.

Under Alternative A, VRM that limits surface disturbance would beneficially impact grassland and shrubland communities.

4.4.2.3.2.3. Resource Uses

Wind-energy development, ROWs corridors, and locatable, leasable, and mineral materials management reduce the acreage of available grasslands and shrublands from both short- and long-term surface disturbance. In the short term as these areas are developed, acres would be removed from the plant community. It is estimated that 52,591 acres would be developed under Alternative A, including ROWs corridors and pads for energy development activities. Furthermore, gravel or dirt roads add to dust particulates that settle on adjacent vegetation in proximity to development areas, resulting in adverse impacts. ROWs corridors remove vegetation and can be difficult to reclaim. Subsequent livestock use can preclude successful reclamation even if initial procedures were well implemented. It is estimated that approximately 9,000 acres of proposed pipelines and utility lines would be installed over the next 20 years under Alternative A.

Alternative A authorizes wind-energy development on 283,647 acres with commercial potential for wind energy, and opens 2,188,294 acres for ROWs.

Under Alternative A, trails and travel management limits motorized travel to existing roads and trails except in some ACECs, where travel is limited to designated roads. Routes and travel can be managed, but unless enforced, there could be long-term adverse impacts to how the vegetation restores itself on the landscape. Travel management has had little on-the-ground implementation; therefore, management limited to designated roads has produced few beneficial impacts to grasslands and shrublands.

Under Alternative A, almost the entire planning area currently is available for livestock grazing. Grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means of improving range conditions on category I allotments and maintaining category M and C grazing allotments. The trend of continued slow improvement in rangeland productivity in the planning area is expected to continue under Alternative A. Short- and long-term adverse impacts to grassland and shrubland communities are anticipated under Alternative A based on continued development of rangeland improvement projects would continue, but riparian-wetland conditions should improve.

There is no recreation management under Alternative A that would beneficially impact grassland and shrubland communities. It is likely that long-term adverse impacts to vegetation would continue as more roads and impacts associated with continued recreational use would continue to grow.

4.4.2.3.2.4. Special Designations

Alternative A designates the same number of ACECs with the same acreage as the 1987 RMP; therefore, there would be continued beneficial impacts to grassland and shrubland communities in the existing ACECs. Under Alternative A, the BLM would apply interim management to the nine waterways eligible for inclusion in the NWSRS to protect their free-flowing characteristics which would provide a beneficial impact to grassland and shrubland communities near these waterways.

Currently, for Congressionally Designated Trails under Alternative A, surface disturbance such as ROW crossings are allowed only where the trail ruts have been modified by modern uses; otherwise, no new disturbances are allowed unless established outside the minimum distance identified under Alternative A for historic trails actions. This management is beneficial to the vegetation protected from disturbance.

4.4.2.3.3. Alternative B

4.4.2.3.3.1. Program Management

Alternative B manages grasslands and shrublands to achieve or make progress toward achieving biological diversity in the plant communities. Alternative B manages and implements soil and vegetative treatments to restore the diversity of grassland and shrubland ecological sites and their transitional states to beneficially impact all resources. This would result in more beneficial impact to vegetative resources than Alternative A, because range improvement projects are focused on rangeland health rather than cattle distribution or increasing animal unit months (AUMs). Alternative B emphasizes wildlife, recreation, and aesthetics, with resulting adverse impacts to resource uses.

4.4.2.3.3.2. Resources

Impacts to soils under Alternative B would be similar to those under Alternative A, except that mineral and realty actions on slopes more than 15 percent, rather than 25 percent, would be managed with Category 6 restrictions. This would reduce adverse impacts to grassland and shrubland communities. Alternative B manages lands with wilderness characteristics in the Little Red Creek Complex as non-WSA land with wilderness characteristics to preserve their wilderness characteristics, which limits surface disturbance that would adversely impact grasslands and shrublands. Water quality protections for sole-source aquifers and discharge areas would beneficially impact vegetation in the areas. The limited amount of identified areas protected by this management would result in minor beneficial impacts to grasslands and shrublands.

Fire and fuels management under Alternative B is similar to under Alternative A, except that suppression efforts would only occur in the WUI, developed recreation sites, identified cultural areas, and aboveground-utility ROWs. There would be no use of heavy equipment during fire suppression without consent from the Authorized Officer. This would beneficially impact grasslands and shrublands in the short term, but could result in long-term adverse impacts as the risk of landscape-level fire increases.

Compared to Alternative A, Alternative B riparian-wetlands management would result in many of the same adverse impacts to grassland and shrubland surrounding riparian-wetland areas, except on a larger area because the riparian-wetland avoidance zone is more than three times as large under Alternative B. Additional impacts to riparian-wetland areas are identified in the *Livestock Grazing Management* section in this chapter.

Beneficial impacts to grasslands and shrublands from INNS management under Alternative B would be similar to Alternative A. However, there would be more beneficial impacts under Alternative B because the Authorized Officer could implement a livestock flushing program. A flushing program could provide a minimum of 72 hours for livestock known to have been using forage that includes INNS seeds to pass any ingested seeds through the rumination process to properly dispose of seeds before livestock enter public lands. This would reduce the spread of invasive species into native grasslands and shrublands in the planning area. Furthermore, because range improvement projects would be restricted under Alternative B, more financial resources would be available to INNS abatement programs. Alternative B would result in the fewest acres of surface disturbance to control or eradicate invasive species; however, because of the projected overall surface disturbance, reclamation practices, and restrictions on motorized vehicle use, Alternative B also would result in the smallest area vulnerable to invasive species establishment. Alternative B would result in the fewest adverse impacts to grassland and shrubland communities from INNS management. In addition, the terms of all authorized activities would be adjusted to reduce the spread of invasive species in the planning area.

Wildlife management actions under Alternative B would result in more indirect beneficial impacts to grassland and shrubland communities than any other alternative. Alternative B applies the most surface disturbance restrictions around greater sage-grouse leks and in nesting and early brood-rearing habitats, which would result in short-term beneficial impacts by preventing vegetation removal or degradation. However, Alternative B could also result in the least long-term beneficial impact in these areas by restricting vegetation treatments in areas where the vegetation community is extremely degraded, especially by occurrence of INNS, or by the increase in certain conifer species (e.g., juniper). The short-term beneficial impacts of preventing vegetation loss from surface disturbance could outweigh potential loss of long-term beneficial impacts from vegetation treatments where they are necessary to restore degraded vegetation communities. Impacts from wild horses grazing grasslands and shrublands would be similar to those under Alternative A.

Impacts from cultural and paleontological resource management under Alternative B would be similar to those under Alternative A, except that no new range improvement projects would be constructed on 834 acres of Warm Springs Canyon in Dubois, which would have a beneficial impact on grassland and shrubland plant communities in that allotment. Alternative B VRM limits surface disturbance more than Alternative A, with increased beneficial impacts to grasslands and shrublands.

4.4.2.3.3.3. Resource Uses

Under Alternative B, oil and gas, wind-energy, and minerals development would result in 16,549 acres of short-term surface disturbance, a portion of which would adversely impact grassland and shrubland communities by contributing to a decline in abundance, distribution, or health. This would be substantially less adverse to vegetative health than Alternative A. Alternative B allows the fewest new oil and gas wells and a limited number of acres open to mineral extraction. Alternative B makes available a limited number of acres for locatable mineral entry (approximately 1.2 million acres), which results in the least amount of long-term surface disturbance compared to the other alternatives. Some of the impacts would be temporary during the life of the operation, with areas of disturbance being reclaimed following closure of operations.

Alternative B would result in the least acreage of disturbance from pipeline and road development, and the greatest chance of successful reestablishment of grasses and shrubs following construction. Alternative B is also projected to result in the least new ROW construction because of limits to protect greater sage-grouse habitat and reduced disturbance associated with oil and gas and other mineral development. The projected new ROWs for mineral development under Alternative B and management designed to encourage large contiguous blocks of important plant communities would result in the least potential for fragmentation of grasslands and shrublands and associated loss of diversity, compared to the other alternatives.

Motorized vehicle use under Alternative B would result in impacts to grasslands and shrublands similar to those under Alternative A, but to a lesser degree. Motorized vehicle use in most of the planning area is limited to designated roads and trails under Alternative B. Alternative B protects winter wildlife habitats, sensitive soils, watersheds, and visual resources, and because motorized and mechanized travel is limited to designated roads and trails subject to seasonal travel limitations in areas where there are limitations, this would have a beneficial impact on grassland and shrubland habitats. Overall, Alternative B would result in the fewest adverse impacts to grassland and shrubland communities from motorized vehicle use, compared to the other alternatives.

Under Alternative B, on an allotment-by-allotment basis, stocking rates would be established to achieve an adequate residual cover for wildlife and wild horses with a likelihood that utilization would not exceed 21 to 40 percent, or light use. Managing to a use level of 21 to 40 percent would result in long-term beneficial impacts to grasslands and shrublands. An increase in vigor, seed production, root reserves, and leaf growth would be most noticeable over the long term, but managing to a use level of 21 to 40 percent also would be expected to result in short-term beneficial impacts. Compared to Alternative A, under Alternative B, the placement of salt and mineral supplements no closer to water than ½ mile would decrease livestock impacts to vegetation adjacent to water. Placing salt and mineral supplements this distance away would improve livestock distribution, thus minimizing impacts to vegetation in grassland and shrubland communities. Alternative B would result in the least acreage disturbed from rangeland improvements such as reservoirs, pits, pipelines, and wells and fences, and pose the least threat to grasslands and shrublands from invasive species spread and livestock concentration. Conversely, decreasing surface-disturbing rangeland improvement activities could adversely impact some grassland and shrubland communities where problems with livestock distribution cannot be addressed without these projects. Reductions in livestock numbers over time are expected to decrease adverse impacts to grasslands and shrubland. However, this reduction is expected to be gradual and in response to monitoring. These areas should show slow improvement from the grazing management implemented.

4.4.2.3.3.4. Special Designations

Alternative B designates the most acres of any alternative as ACECs and other special designations with management prescriptions that limit surface disturbance. This management would beneficially impact grassland and shrubland communities. In all ACECs, identified roads would be reclaimed to reduce erosion. This includes additional acreage reclaimed and brought back into grassland and shrubland community production. Although small in acreage, this would add plants to the existing community. ACEC expansions under Alternative B therefore would extend the beneficial impacts to grassland and shrubland communities to a larger area. Beaver Rim ACEC management would have direct beneficial impacts on sensitive plant species and unique plant communities in the ACEC. The Government Draw/Upper Sweetwater Grouse ACEC has limited vegetation treatments to those lands within the proposed ACEC to enhance and improve grassland and shrublands habitats of the ACEC. This is a major beneficial impact when compared with Alternative A. Under Alternative B, rangeland improvements and mineral supplementation are not allowed within 3 miles of Congressionally Designated Trails unless those activities would not be visible from the trails. Although it is possible individual projects would be allowed on a site-specific basis, because of topography it is likely that this management would close 305,422 acres to rangeland developments. This would provide immediate relief to vegetation adjacent to the trail corridors, where livestock congregate and trample and over use vegetation. Beneficial impacts of implementing this restriction over a greater distance would improve livestock distribution and improve the plant health and vigor of grassland and shrubland communities.

4.4.2.3.4. Alternative C

4.4.2.3.4.1. Program Management

Alternative C manages to achieve or make progress toward achieving Wyoming Standards for Healthy Rangeland for grasslands and shrublands. The Alternative C approach involves more livestock-dependent economic uses of vegetation, but these uses would be supported with increased use of BMPs designed to mitigate adverse impacts. However, the projected reduced vegetative treatments under Alternative C as funds are used to build range infrastructure would result in adverse impacts. Those adverse impacts could be offset by using the range improvements across the greatest area to achieve rangeland health standards in areas requiring rehabilitation.

4.4.2.3.4.2. Resources

Impacts would be more adverse under Alternative C than under Alternative B, and similar to those under Alternative A, by allowing surface disturbances on slopes of up to 25 percent, which would increase the chances of soil erosion through wind and water. This would directly impact vegetation in grassland and shrubland communities, which would be at higher risk to loss as construction activities increase on steeper slopes. Alternative C does not specially manage any lands with wilderness characteristics, so there would be no beneficial impacts to the grasslands and shrublands in this area.

Alternative C utilizes wildland fires and other vegetation treatments to restore fire-adapted ecosystems, reduce hazardous fuels, and enhance forage for commodity production. Alternative C includes the same acreage of fuels treatments as Alternative A, and therefore the same probability of adequate fuel reductions to substantially reduce the risk of landscape-level fire. This is less treatment than under Alternative B. In addition, Alternative C requires full suppression in all cases. Compared to the other alternatives, this alternative would result in the short-term beneficial impact of preventing fire that could destroy or permanently alter grassland and shrubland communities. Full suppression, however, risks a landscape-level fire with long-term adverse impacts to grassland and shrubland communities.

Impacts to grasslands shrublands in the vicinity of riparian-wetlands would be similar to Alternative A. Under Alternative C, however, range improvement projects, travel management, and road construction activities are fully utilized to make progress toward achieving Wyoming Standards for Healthy Rangelands. The advantages to vegetation associated with project infrastructure for grazing management would be offset by increased stocking rates over time. Grazing strategies that entail high stocking and intensive management for a short period have been proven effective, and they are particularly useful when applied to areas where livestock show high preference for some areas of a grazing allotment. However, these systems need to be implemented with precision and they constitute a higher-risk strategy for adverse impacts to grasslands and shrublands than the prescriptions associated with Alternative B.

Under Alternative C, the impacts to vegetative communities from INNS management would be similar to impacts under Alternative A. Impacts associated with INNS management would be the greatest under Alternative C because it involves the most surface disturbance, which makes the most acres vulnerable to new INNS. INNS would establish new surface disturbance and less restrictive management of motorized vehicle use. Alternative C relies on the extensive use of BMPs to contain INNS infestations.

Wildlife management actions under Alternative C would result in the least beneficial impacts to grassland and shrubland communities, compared to the other alternatives. Compared to the other alternatives, Alternative C applies the same surface disturbance restrictions around greater sage-grouse leks and in nesting and early brood-rearing habitats as Alternative A, and many fewer than Alternative B. These management actions would result in the least short-term beneficial impacts by preventing vegetation removal or degradation in these areas. Alternative C gives livestock forage requirements priority when allocating grassland and shrubland forage. In areas identified as crucial winter range and parturition areas, Alternative C would manage vegetation to benefit all grazing and browsing animals (livestock and wildlife). Alternative C allows vegetation treatments over a larger area than the other alternatives. This would result in long-term beneficial impacts to grasslands and shrublands by reducing fuel loads; however, Alternative C provides substantially less funding for vegetation treatments than Alternative B, because it allocates funds for range development.

Impacts to grasslands and shrublands from cultural, paleontological, and VRM under Alternative C would be similar to impacts under Alternative A, except that VRM for areas designated as ACECs (see below) includes fewer limitations on surface disturbance and therefore results in more adverse impacts to grasslands and shrublands.

4.4.2.3.4.3. Resource Uses

Under Alternative C, oil and gas and other minerals development would result in more short-term surface disturbance, a preponderance of which would adversely impact grassland and shrubland communities by contributing to a decline in abundance, distribution, or health of the vegetation. Alternative C would result in the most new oil and gas wells and the most area to remain open to mineral extraction. Leasable minerals development would result in the greatest amount of long-term surface disturbance, and potential development would be more likely under Alternative C than the other alternatives. Some impacts would be temporary during the life of operations, with areas of disturbance being reclaimed following closure of operations. Overall, minerals development under Alternative C would result in the greatest adverse impact to grassland and shrubland communities. Alternative C makes available the most area for wind-energy development, which would result in adverse impacts to vegetation.

Surface disturbance under Alternative C would result in the largest number of acres to reclaim. As acres of disturbance increase, the chances of successful reclamation in these areas would decrease compared to the other alternatives. Alternative C allows the greatest acreage of disturbance from pipeline and road development and more chance reestablishment of grasses and shrubs would not be successful following construction. In DDAs, reclamation standards address soil stabilization in the interim with a higher percentage of grasses, rather than restoring predisturbance plant communities (see Appendix D (p. 1391)). Alternative C includes the most new road construction associated with mineral and realty development, with the greatest potential for fragmentation of grasslands and shrublands. Fragmentation of lands associated with loss of species diversity would be an adverse impact to grasslands and shrublands under Alternative C, unlike Alternative B, which manages for large contiguous blocks of important plant communities.

Alternative C also limits motorized vehicle use to existing or designated roads and trails with seasonal travel limitations on the Lander Slope and in the Red Canyon, Whiskey Mountain, Green Mountain, and East Fork areas. Alternative C also limits motorized travel in the WSA portion of the Dubois Badlands and the Castle Gardens ACEC to designated roads and trails. In addition, WSAs retains limits on motorized travel to designated roads and trails as described for Alternative A. These limitations would beneficially impact plant communities, but Alternative C protects fewer communities than alternatives A and B. Alternative C would result in the most long-term surface disturbance from motorized vehicle use as a result of BLM actions, which would directly impact grasslands and shrublands by removing vegetation. Alternative C allows cross-country motorized travel for carcass retrieval and dispersed campsites so long as there would be no resource damage, which would result in more adverse impacts than alternatives A and B. However it is difficult to detect and contain subtle impacts such as transportation of INNS, so grassland and shrubland communities at greater risk of adverse impacts under Alternative C than under Alternative B. Overall, Alternative C would result in the most adverse impacts to grassland and shrubland communities from motorized vehicle use compared to the other alternatives.

Alternative C maintains use levels in all grazing allotments on an allotment-by-allotment basis that will result in less residual forage for wildlife consumption and residual cover. This is likely to be at a use level of 41 to 60 percent (moderate use) but that will be determined on a site-specific basis. Placement of salt and mineral supplements is similar to Alternative A, and placed to maximize forage utilization, which would put more use on individual plants in grassland and shrubland communities. Placing salt and mineral supplements ¼ mile from water would increase grazing in the surrounding riparian-wetland vegetation. A secondary impact would be more use in the riparian-wetland communities. Alternative C includes an increase in range improvement projects to make more acres available for grazing, thus adversely impacting traditionally non-grazed grassland and shrubland areas. Over the next 20 years, the BLM estimates that 220 miles of new pasture-division fence will be constructed and 150 new water sources will be developed (34 springs, 48 reservoirs/pits, and 68 new wells). The increase in projects would make approximately 283,000 new acres available for livestock grazing. Increases in stocking must be offset by intensive management enabled by project infrastructure. Intensive management approaches can fail unless they are implemented with precision. Grazing strategies that do not meet objectives would need to be identified and revised, which would require intensive monitoring and management. Some plant communities would change because communities subject to adverse impacts from failed grazing management could cross the “threshold” beyond which the changes would not be not readily reversible.

Under Alternative C, forage reserve allotments are not established and flexibility for permittees with alternative areas to graze would not be available if there were a an event such as a landscape-level wildfire. This would result in the same impact as under Alternative A, and would be more adverse to vegetation than under Alternative B. Not allowing an area to rest and recover from a catastrophic event would reduce desirable vegetation in the area, thus allowing the potential for invasive species to establish. Conversely, having a forage reserve allotment would provide flexibility and relief from grazing in areas that have a catastrophic event.

4.4.2.3.4.4. Special Designations

Alternative C would result in the least beneficial impacts to grassland and shrubland communities than the other alternatives because Alternative C designates no ACECs, and does not recommend any NWSRS-eligible segments as suitable for inclusion in the NWSRS. Congressionally Designated Trails management would have the same reduced beneficial impacts as Alternative A.

4.4.2.3.5. Alternative D

4.4.2.3.5.1. Program Management

Under all alternatives, the BLM manages to achieve or make progress toward achieving Wyoming Standards for Healthy Rangeland for grasslands and shrublands. The approach associated with Alternative D entails more economic uses of vegetation than Alternative B and approximately the same as Alternative A, but these uses are supported with increased use of BMPs designed to mitigate adverse impacts. Compared to Alternative B, Alternative D includes fewer acres of vegetation treatments to improve vegetation conditions and manages to achieve diversity of site composition, approximately the same as Alternative A.

4.4.2.3.5.2. Resources

Alternative D would result in slightly fewer adverse impacts than alternatives A and C in its slope management, but moderately more than Alternative B because there is more surface disturbance in general under Alternative D. In addition, like alternatives A and C, Alternative D allows surface disturbances on slopes of up to 25 percent, which increases the chances of soil erosion through wind and water in grassland and shrubland communities at higher risk for loss when construction activities increase on steeper slopes.

Alternative D utilizes wildland fires and other vegetation treatments to restore fire-adapted ecosystems, reduce hazardous fuels, and enhance forage for healthy rangelands and commodity production. Alternative D includes fewer acres of prescribed fire and fuels treatments than Alternative B, and more acres than alternatives A and C. Alternative D is similar to Alternative A in its fire suppression activities, so its adverse or beneficial impacts to vegetation would the same, which would be more beneficial in the short term and less beneficial in the long term than Alternative B. The reverse is true compared to Alternative C, as Alternative D would result in more adverse short-term and less adverse long-term impacts. Therefore, Alternative D involves a lower risk of landscape-level fire than alternatives A and C, but less than Alternative B. It is not possible to determine the significance of this difference.

Adverse impacts to sagebrush grasslands within ¼ mile of riparian-wetlands under Alternative D would be similar to and somewhat more adverse than under Alternative B and less adverse than under alternatives A and C. Alternative D uses rangeland developments (fences and water developments) to improve riparian-wetlands if they are part of a Comprehensive Grazing Strategy. This management would shift some livestock grazing out of riparian-wetland areas and into uplands that have historically experienced lower utilization levels (see *Resource Uses*). Other strategies may be developed across the planning area with the increased flexibility provided.

INNS management under Alternative D is similar to alternatives A and C in allowing chemical treatment as one of the tools to eliminate INNS where necessary.

Wildlife management actions under Alternative D would beneficially impact grassland and shrubland communities moderately more than under alternatives A and C, but moderately less than under Alternative B because of limitations on surface disturbance. In the greater sage-grouse Core Area, alternatives D and B would beneficially impact grasslands and shrubland communities by prohibiting surface disturbance within 0.6 miles of greater sage-grouse leks. However, outside the Core Area, Alternative D applies a ¼-mile buffer around leks, which would be moderately more adverse than the Alternative B 0.6-mile buffer. Limits on surface disturbance would result in beneficial impacts by preventing vegetation removal or degradation and long-term beneficial impacts where reclamation or reestablishment of predisturbance conditions is not likely or the vegetation is permanently removed.

Alternative D focuses on vegetation for all foraging animals, unlike Alternative C, which prioritizes livestock forage requirements. In this regard, Alternative D would result in fewer beneficial impacts than Alternative B and more than alternatives A and C.

Under Alternative D, impacts to grasslands and shrublands from cultural, paleontological, and VRM would be similar to Alternative B, but less beneficial. Alternatives B and D would result in more beneficial impacts to vegetation from heritage and VRM than alternatives A and C as a result of limits on surface disturbance to protect these resources.

4.4.2.3.5.3. Resource Uses

Under Alternative D, leasable minerals and other minerals development result in more short-term surface disturbance than Alternative B, but less than alternatives A and C. Alternative D includes more areas proposed for withdrawal from locatable mineral entry and therefore more beneficial impacts to grasslands and shrublands than alternatives A and B, but less than Alternative B. Alternative D closes more areas to mineral materials disposal than alternatives A and C. Alternative D would result in more beneficial impacts to grasslands and shrublands than alternatives A and C, but less than Alternative B. Some of the adverse impacts would be temporary during the life of the operation, with areas of disturbance reclaimed following closure of operations; however, long-term adverse impacts from mineral developments could result from unsuccessful reclamation to predisturbance conditions. Overall, minerals development under Alternative D would result in the second least adverse impacts to grassland and shrubland communities.

Alternative D opens the fewest areas for wind-energy development of any alternative and therefore would result in the fewest adverse impacts to grasslands and shrublands. See Chapter 2 for a comparison of these acres and management. Wind-energy development disturbs large areas of surface and much of the disturbance would be permanent. Therefore, the more acres open to wind-energy development and related transmission lines, and the more area open to all ROWs, the more adverse the impacts to vegetation.

Surface disturbance under Alternative D would result in more acres to reclaim than under Alternative B, moderately fewer than under Alternative A, and moderately to substantially fewer than Alternative C, thus decreasing the likelihood of both short and long-term adverse impacts to grassland and shrubland communities. The Alternative D reduced area of disturbance from pipeline and road development would result in a better chance of successful reestablishment of grasses and shrubs following construction. In energy development areas, reclamation standards address soil stabilization in the interim with a higher percentage of grasses, rather than restoring predisturbance plant communities (see Appendix I (p. 1435)).

Alternative D includes the second lowest new ROW construction associated with mineral and realty development, with substantially less potential for fragmentation of grasslands and shrublands than alternatives A and C. Fragmentation of lands associated with loss of species diversity, an adverse impact to grasslands and shrublands; therefore, Alternative D, like Alternative B but to a lesser degree, would beneficially impact grasslands and shrublands by managing for large contiguous blocks of important plant communities.

Alternative D closes fewer areas to motorized vehicle use than Alternative B, but more than alternatives A and C; Chapter 2 identifies the respective acreage under each alternative. Alternative D also imposes restrictions on new road development similar to those under Alternative B, but to a lesser extent. Limitations on roads and motorized vehicle travel would beneficially impact grasslands and shrublands by limiting the removal of vegetation and deterring user-created roads. This would be substantially more beneficial than alternatives A and C, which do not include this management.

Under Alternative D, livestock grazing management overall would be more beneficial to shrubland and grassland communities than alternatives A and C, but less Alternative B. Although the livestock grazing program might use rangeland improvements such as fences and water (see Chapter 2), they are authorized only when the benefits associated with the improvement in rangeland health exceed the adverse impacts associated with the project. As implemented on an allotment basis, with proper stocking levels and implementation of range improvements, this would avoid adverse impacts to grassland and shrubland communities. Alternative D would result in somewhat fewer adverse impacts to upland communities than Alternative A and moderately fewer than Alternative C, but more than Alternative B. This requires that identified rangeland health issues be addressed through lowered stocking rates or other non-infrastructure-related management.

Range improvement projects under Alternative D would develop water in upland acres to increase their suitability for livestock grazing. Other strategies may be developed across the planning area with the increased flexibility provided. This would have the potential to adversely impact grasslands and shrublands that have not historically been grazed by domestic animals.

Alternative D fully utilizes range improvement projects, travel management, and road construction activities to make progress toward achieving the Wyoming Standards for Healthy Rangelands. The decreased stocking rates would result in moderate beneficial impacts to grasslands and shrublands when associated with project infrastructure for grazing management. Grazing strategies that entail high-stocking levels and intensive management for a short period have been proven effective, and they are particularly useful when applied to areas where livestock show high preference for some areas of a grazing allotment. However, these systems need to be implemented with precision and they constitute a higher risk strategy for adverse impacts to grassland and shrublands than the prescriptions associated with Alternative B. Grazing strategies that are not meeting objectives would need to be identified and revised requiring intensive monitoring and management. Some plant communities would undergo change, in that plant communities considered to have adverse impacts from grazing management failure may cross the "threshold" beyond which these changes are not readily reversible.

Alternative D livestock grazing management regarding the placement of salt and mineral supplements would result in beneficial impacts to uplands similar to Alternative B and moderately more beneficial impacts than alternatives A and C because Alternative D identifies larger avoidance zones.

Alternative D would result in moderately more adverse impacts to grassland and shrubland communities than Alternative B by establishing stocking rates on an allotment-by-allotment basis that would result in residual forage for wildlife similar to alternatives A and C and would likely result in utilization not exceeding 41 to 60 percent (moderate use). As use levels approached 60 percent, this would result in some areas experiencing more adverse impacts than for the light use under Alternative B.

As under Alternative B, forage reserve allotments under Alternative D would be established when opportunities allow, which would provide flexibility for permittees if an event such as a landscape-level wildfire occurred, and would be a beneficial impact to grassland and shrubland communities. Alternatives A and C do not manage with forage reserves, which would result in a greater adverse impact to vegetation than Alternative D.

4.4.2.3.5.4. Special Designations

Alternative D management of Congressionally Designated Trails precludes the use of livestock supplements within ½ mile of NHTs and regional trails unless they would not be within view of the trails. This would result in the same beneficial impacts to the grassland and shrubland communities as Alternative B. Alternatives A and C would result in more adverse impacts because the buffer is smaller under those alternatives. Alternative D is less restrictive with VRM and would include more range improvement projects than Alternative B in areas near the Congressionally Designated Trails. This would result in a minor adverse impact to grasslands and shrublands, but far less than alternatives A and C.

Alternative D limits additional range improvements acres in areas where money generated through leasing fees may be spent (Taylor Grazing Act Section 15 allotments) unless the purpose of the project is to enhance certain ACEC resource values. This is less than Alternative B and therefore less beneficial to grassland and shrubland communities. Alternatives A and C do not include limits on rangeland improvements for any ACEC.

Alternative D recommends the Baldwin Creek Unit and Sweetwater River Unit as suitable for inclusion in the NWSRS and would manage these waterways to protect their free-flowing values, providing a beneficial impact to grassland and shrubland communities near these waterways. Theoretically, Alternative D would result in fewer beneficial impacts to grassland and shrubland communities than Alternative B because Alternative D protects fewer waterways. However, this difference can only be quantified on a site-specific basis because vegetation mapping is not fine enough to distinguish grassland and shrubland plant communities at a planning area-wide scale.

4.4.3. Invasive Species and Pest Management

This section describes the impacts to the INNS program under each alternative in terms of direct, indirect, short-term, and long-term impacts.

The presence of INNS in the planning area is considered an adverse impact. Actions that contribute to the introduction of INNS, the spread of existing INNS populations, or that avoid, reduce, or prohibit INNS control activities in the planning area also are considered adverse impacts. Actions that reduce opportunities for INNS spread are considered beneficial impacts.

Direct impacts to INNS management typically result from actions that disturb the soil or that otherwise create habitats (seedbed) for the establishment of INNS. Indirect impacts result from activities that avoid, reduce, or prohibit INNS control activities in the planning area. The transport to other locations of INNS seed or propagules by wildlife, livestock, vehicles, wind, or water, thereby expanding the distribution of INNS or increasing the rate of INNS spread, is also considered an indirect impact.

4.4.3.1. Summary of Impacts

INNS would be expected to spread under all alternatives. Alternatives that involve the most projected surface disturbance would have the potential to result in the greatest spread of INNS. Stringent reclamation requirements, especially reclamation plans before surface disturbance, would decrease long-term disturbance and the likelihood of INNS establishment. Based on projected surface disturbance, Alternative C would result in the greatest spread of INNS, followed by alternatives A, D, and B, having the least potential surface disturbance.

4.4.3.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Roadways, trails, and ROW and other corridors are the most likely routes for the spread of INNS through transport on motorized vehicles, including OHVs. INNS also can spread through watercourses, by wind, and by wildlife and livestock movement.
- Although there are exceptions, most INNS are less likely to invade relatively undisturbed and healthy natural vegetative communities.
- The amount of new surface disturbance associated with an alternative is a good index for measuring potential impacts of INNS. The larger the acreage of surface disturbance, the greater the potential adverse impacts of INNS, although it is not necessarily a linear

relationship. Mineral exploration and development, including oil and gas leasable minerals, non-oil and gas leasable minerals, locatable minerals, and salable minerals often result in high levels of surface-disturbing activity and human presence, which leads to the introduction and establishment of INNS. The more mineral development, the more adverse impact to the INNS, although reclamation efforts can help reduce this trend.

- Partners Against Weeds – An Action Plan for the BLM (BLM 1996) establishes a strategy to prevent invasive plant species through cooperation with all partners. It outlines goals and specific actions to help prevent and control the spread of invasive plant species. This action plan, along with any future updates and guidance, will be followed to control and prevent invasive plant species problems under all alternatives.
- Seeds from some INNS can remain dormant and viable in the soil for periods that exceed the 5-year division between short- and long-term impacts. Therefore, favorable site conditions could serve to reintroduce INNS in the short term without additional surface disturbance.
- INNS will continue to be introduced and spread as a result of ongoing traffic in and out of the planning area by recreational activities, wildlife and livestock movements and grazing, and surface-disturbing activities.
- The BLM will continue to treat INNS and pests on public land. Livestock permit holders, ROW holders, and mineral lease, claim, and permit holders will continue to treat noxious and invasive plant species and pests on public land as stipulated in their permits and authorizations. This does not vary by alternative.
- Weed and pest control, inventory, monitoring, and research will be performed in coordination with the appropriate federal and state agencies and authorized users of BLM-administered public lands, with the appropriate county weed and pest control districts acting as the primary points of contact among all involved parties.
- The introduction of invasive invertebrates, vertebrates, microorganisms, and pathogens can threaten the stability of ecosystems, create serious human health consequences, and cause substantial economic burdens. Most INNS do not pose a threat to natural or human systems. However, pests are defined as any organism that causes economic or aesthetic damage to humans or their property, and species defined as pests change frequently. As species become of greater concern, the Lander Field Office will cooperate and coordinate with appropriate government agencies, private industry, and other interested parties involved in public education efforts and control, management, and research of INNS.
- BLM Washington Office IM 2006-073, Weed-Free Seed Use On Lands Administered by the Bureau of Land Management, establishes policy and guidance for use of certified weed-free seed and BLM Washington Office IM 1999-076, BLM Policy on the Use of Certified Weed-free Hay, Straw, and Mulch on BLM Land, establishes policy for the use of certified weed-free hay, forage, straw, and mulch to prevent the establishment of new INNS in restoration projects on public lands.

4.4.3.3. Detailed Analysis of Alternatives

4.4.3.3.1. Impacts Common to All Alternatives

The types of impacts of INNS and pest control would be common to all alternatives. The BLM will coordinate with individuals, groups, and other agencies to utilize Integrated Pest Management (IPM) using chemical, biological, and cultural methods for the control of INNS and pests as needed. The types of impacts under the alternatives would be similar; however, the intensity of impacts would vary by alternative. Impacts resulting from surface-disturbing activities (e.g., fire management, minerals and realty actions, recreation, dispersed travel, and the management of special designations) and surface-disruptive activities (e.g., livestock grazing and OHV use) are described under each alternative.

INNS on BLM-administered surface lands and federal mineral estate could spread under each alternative through activities proposed across a variety of resource programs. While the types of impacts from INNS as a result of surface-disturbing activities would not vary by alternative, the intensity would. Appendix T (p. 1535) lists projected surface disturbance by alternative during the planning period. The acres of surface disturbance in the analysis that follows are from this appendix. INNS create adverse impacts because of the lack of natural predators capable of keeping the system in balance. INNS can lead to unstable soils, changes in soil chemistry, losses in land productivity, loss of wildlife habitat, and loss of available forage for wildlife and livestock. Species such as cheatgrass have a profound influence on the fire regime; they impact fire frequency, which leads to additional direct and indirect adverse impacts. Pollen from invasive plant species can adversely impact human health by causing hay fever and other allergic reactions.

Adverse impacts from surface disturbance are different depending upon type of disturbance. The more dispersed the disturbance and the less concentrated the disturbance, the greater the adverse impact to INNS because of the greater likelihood of spread.

Healthy herbaceous communities that meet the Wyoming Standards for Healthy Rangelands are more resistant to INNS invasion than vegetation communities in an earlier seral stage or showing signs of degradation. Outbreaks of insects such as grasshoppers and Mormon crickets can result in severe forage losses and can lead to adverse impacts to the health of the herbaceous community. Some pathogens, such as West Nile virus, or other mosquito-transmitted diseases rely on the availability of stagnant water typically found in playas, ponds, reservoirs, and drilling reserve pits. As mosquito populations increase, so does the potential for exposure to pathogens such as the West Nile virus; Fremont County commonly leads the state in reported cases of West Nile virus. Rodents such as mice can increase the potential for exposure to viral pathogens such as hantavirus. However, these types of exposures are generally confined to very small sites that provide the habitat needs of the animals.

All alternatives use various methods to minimize impacts from INNS. BMPs, watershed enhancement projects, conservation practices, Storm Water Discharge Plans, project-specific soil investigations, and reclamation plans are designed to reduce adverse impacts to soil, resulting in greater reclamation success and limiting opportunities for INNS establishment. The BLM participates in the Fremont County Weed and Pest Control District to coordinate efforts in three Weed Management Areas, where there is a unified effort between agencies and landowners in each Weed Management Area. The three Weed Management Areas cover all of the BLM-administered lands in Fremont County.

Although the alternatives vary in the amount of federal mineral estate open to locatable mineral development and mineral material disposals, a much smaller area has commercial potential. All alternatives foresee that approximately 95 acres a year will be disturbed for locatable mineral entry and 183 acres will be disturbed for mineral material disposals, although this could change with market changes and activities. Accordingly, the alternatives do not vary in the INNS impacts.

INNS often have a strong correlation to sources of readily available water such as reservoirs. Under all alternatives, the Lander Field Office will inventory reservoirs on BLM-administered lands and prioritize the rehabilitation or reclamation of the ones functionally compromised. This would help disturbed sites resist INNS and, with successful rehabilitation or reclamation, be a long-term beneficial impact.

Wind-energy development has adverse impacts to the INNS program. Industrial-scale development requires a wide spacing — 5 to 6 turbines per 640 acres (one section) or 128 to 107 acres spacing. This will require more roads and more underground utilities over a far broader area than any other type of resource use. Oil and gas wells, in contrast, are generally on 40 acre spacing and ISR uranium wells can be as concentrated as 100-foot spacing. Thus, the degree of adverse impact to the INNS program is disproportionately greater than the acres disturbed. Only portions of the long-term disturbance would result in adverse impacts to the INNS program because buildings and other permanent structures themselves do not contribute to INNS although roads and human activities do.

Concentrated livestock use has resulted in adverse impacts when the removal of herbaceous vegetation is excessive and adequate vegetation does not remain to protect the soils. Loss of native vegetation provides opportunities for INNS to establish, but each alternative contains BMPs designed to limit this impact. The acres closed to livestock grazing would not have any potential for these adverse impacts from livestock grazing although other forms of concentrated herbivory could have similar impacts.

All alternatives assume that existing range infrastructure will remain although some alternatives provide for removal or moderate fences as opportunities occur. The different among the alternatives on a planning area wide basis would be minimal. The alternatives vary substantially in whether new range infrastructure will be utilized or whether vegetation treatment types of range improvement projects will be implemented.

All alternatives prohibit cross-country motorized travel, which would prevent the proliferation of unauthorized routes and vegetation removal that could increase suitable habitat for invasive plant species infestations or spread invasive plant species seeds and propagules to uncontaminated locations. In addition, management actions that restore plant communities, enhance native plant communities, and make them better able to resist invasive plant species invasion. Impacts from surface-disturbing and disruptive activities are mitigated through the application of the Wyoming BLM Standard Mitigation Guidelines for Surface-Disturbing and Disruptive Activities (Appendix M (p. 1489)).

The wildland fire program will consider the presence and potential for INNS when designing wildland fire response and fuels treatments. On a case-by-case basis, all equipment and vehicles used for BLM-authorized activities, including the fire program, would be cleaned of INNS seeds and propagules before entering BLM-administered lands. Typically, this provision applies to out-of-county fire vehicles and equipment.

The presence of invasive plant species can alter natural fire regimes to the point where increased fire frequency leads to adverse short- and/or long-term impacts that degrade other resources, such as accelerated soil erosion and fertility losses, water quality degradation, loss of wildlife habitat and species diversity, loss of livestock forage, and in some cases, risks to property and human health and safety. Under all alternatives, the Lander Field Office will coordinate with other agencies to develop a plan for the management of cheatgrass in an effort to minimize the impacts of cheatgrass to the natural fire frequency cycle, and impacts to soil stability and forage production. Prescribed fire in the planning area can impact soils in the short term by removing vegetation and exposing soils to water and wind erosion. Following a fire, early seral-stage species and INNS can become established and can provide some stabilization of soils. However, the level of soil stability provided by these early seral-stage species is limited. In the long term, fire can beneficially impact soil resources and, secondarily INNS management, by improving land health and reducing erosion and the risk of landscape-level fire. Following successful reclamation, the BLM does not anticipate long-term surface disturbance or associated erosion from prescribed fire or chemical or mechanical fuels treatments. Fuels management could result in a short-term adverse impact and a long-term beneficial to soil resources. The amount of fuels treatment varies by alternative.

INNS are managed to meet the Wyoming Standards for Healthy Rangelands (Appendix J (p. 1437)) to protect and improve rangeland health. Of priority concern are Wyoming Declared Weeds; their presence is considered a threat, regardless of their influence on rangeland health (BLM 2009l).

All alternatives manage grassland and shrubland communities to meet Wyoming Standards for Healthy Rangelands. The differences between favoring production more oriented toward wildlife, wild horses, or livestock does not lead to different impacts as a result of management emphasis, because all of these animals will contribute to the spread of invasive plant species via their movement across the landscape. However, livestock are more likely than wildlife to ingest INNS before they are turned out on the public lands because INNS infestation is more prevalent on private lands.

All alternatives implement a program to promote public awareness of INNS and emphasize the Wyoming Declared Weeds and INNS most likely to invade from other states. Early detection is critical to the control of invasive plant species; therefore, public awareness provides a benefit to IPM management.

Requiring BLM-authorized activities and programs to use certified weed-free forage, mulch, and other land-applied products (BLM 1999) would result in beneficial impacts by limiting a possible vector for infesting BLM-administered lands and other adjacent land. The county weed and pest control districts certify these products locally and maintain lists of local providers. All alternatives require weed-free feed; therefore the beneficial impacts of this management would not vary by alternative.

INNS program management actions common to all alternatives, on a case-by-case basis, require that all equipment and vehicles used to perform BLM program work or authorized activities be cleaned of INNS seeds and propagules before they enter BLM-administered lands. Also, equipment and vehicles that perform BLM program work or authorized activities in areas of known INNS/Wyoming Declared Weeds will be required to be cleaned of INNS seeds and propagules before leaving worksites; containment of sediment and wash water is required. These requirements for cleaning equipment and vehicles to prevent the spread of INNS beneficially impact other resources that rely on healthy vegetative communities.

WSAs will remain unchanged under any alternative with a total of 55,338 acres. Surface-disturbing activities are highly restricted in WSAs, thus providing a collateral beneficial impact for management of INNS.

All alternatives include actions that restrict surface disturbance in the planning area; these actions are generally considered to result in a beneficial impact by stopping the spread of INNS. For example, withdrawals that close areas to surface-disturbing activities, or requirements for construction, operation, monitoring, and rehabilitation planning before surface-disturbing activities are initiated would, at a minimum, reduce the potential for impacts that could contribute to the spread of INNS.

All alternatives will require mineral and realty applicants to prevent introduction and spread of INNS. This management historically did not prevent introduction of INNS along new roads and other surface disturbance. In all alternatives INNS management efficacy is dependent upon enforcement.

The management of the Beaver Rim area varies by alternative. The impacts to the INNS program are the same as the impacts to the oil and gas program but in reverse. Alternatives B and D limits surface disturbance either by closing the area to leasing or making a portion of the area subject to an NSO stipulation. By limiting surface disturbance, the INNS program is beneficially impacted. Similarly, alternatives A and C only utilize standard steepness of slope stipulations and therefore allow more surface disturbance which increases the potentially adverse impacts to the INNS program in the Beaver Rim area.

4.4.3.3.2. Alternative A

4.4.3.3.2.1. Program Management

Alternative A manages authorized activities likely to spread INNS on a case-by-case basis. This includes cleaning work equipment to remove INNS seeds and propagules; the use of certified weed-free materials; site-specific INNS inventories; avoidance; eradication/treatment; enhanced weed-free seed requirements for reclamation work; monitoring; and coordination with the appropriate county weed and pest control district. These methods have worked well to limit the introduction of declared (Wyoming) weeds to surface disturbances authorized by the BLM.

Range improvement projects almost always involve the construction of infrastructure such as fences and water developments rather than vegetation and weed treatments. Under present management, livestock flushing has not been required for livestock that move from private lands infested with Wyoming Declared Weeds to BLM-administered lands, which puts BLM-administered lands at risk of infestation from this vector.

Under Alternative A, the Lander Field Office will monitor and determine if authorized activities are contributing to the spread of INNS. In the event authorized activities are creating an adverse impact due to the spread of INNS, the Lander Field Office will adjust the terms of the authorization to aid in the control of INNS on a case-by-case basis. This provides a beneficial impact to INNS management in the areas where adjustments are made.

4.4.3.3.2.2. Resources

Alternative A management imposes standard measures to mitigate for impacts to soils, which would beneficially impact INNS management by restricting development in the areas with LRP soils. The water resources program under Alternative A prohibits or avoids surface-disturbing activities in groundwater recharge areas on a case-by-case basis, which would beneficially impact the INNS program to a moderate degree. Alternative A does not restrict the use of pesticides for INNS control. The restrictions on the pesticide label are considered adequate to protect groundwater resources when applied correctly.

Alternative A includes full suppression of fire and authorizes soil disturbance associated with suppression activities on a case-by-case basis. Fire suppression and rehabilitation activities also have the potential to spread INNS, an adverse impact in both the short and long term. Activities such as firebreak construction, vegetation clearing, and use of heavy equipment would disturb the soil surface and increase the risk of INNS introduction and infestation in the short term. In the long term, however, successful stabilization efforts can increase cover, with a subsequent reduction in erosion and sediment production to natural rates.

Forest and woodland management for the promotion of timber production under Alternative A restricts certain forest product sales in areas where soil erosion is likely, which would beneficially impact INNS management. These restrictions would reduce short-term adverse impacts from exposing disturbed soils to INNS infestation. In the long term, these restrictions would help return the forest community to natural levels of appropriate vegetative species and ground cover. However, this beneficial impact would likely be minimal because of the limited demand for forest products. Alternative A avoids surface-disturbing activities within 500 feet of surface water and riparian-wetland areas, which creates a buffer that will afford native plant communities moderate short- and long-term protection from potential INNS introduction and infestation.

Management actions under Alternative A designed to protect wildlife and special status species habitat from the impacts of surface-disturbing and surface-disruptive activities would also protect the planning area from adverse impacts associated with the presence of INNS. Restrictions such as NSO and CSU in crucial wildlife habitat would limit development in these areas and provide a mutual beneficial impact for INNS management. This alternative closes and reclaims unnecessary roads and old mineral exploration trails to improve habitat on a case-by-case basis. The degree of this less protective management depends on whether disturbance would be likely for development.

Management for the benefit of greater sage-grouse minimally limits surface disturbance and thus provides only a small protection from INNS. It is likely that the ¼-mile buffer will only relocate disturbance and will not serve to cap it.

Management prescriptions under Alternative A designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and surface-disruptive activities would also protect against adverse impacts associated with INNS introduction and infestation. Disturbed soil is highly susceptible to INNS infestation. Therefore, limits on surface disturbance would help the land resist weed seed germination, and limiting motorized vehicle use would eliminate that vector for weed seed and propagule introduction.

4.4.3.3.2.3. Resource Uses

As indicated in *Impacts Common to All Alternatives*, mineral development generally results in an increase in the introduction and spread of INNS. Alternative A is expected to result in approximately 21,234 acres of initial disturbance and approximately 9,895 acres of long-term disturbance related to mineral development. Alternative A opens a substantial amount of the planning area to non-oil and gas leasing but only small areas have mineral development potential (primarily phosphate). If these resources were developed it is likely that INNS management would be adversely impacted. Analysis of phosphate development is found in the discussion of Lander Slope, Red Canyon, and Beaver Rim ACECs in the *Areas of Critical Environmental Concern* section in this chapter. No acres of surface disturbance are projected.

Alternative A withdraws approximately 23,114 acres from locatable mineral entry, which would beneficially impact INNS management because it would restrict surface disturbance in those areas. Almost all of the mineral estate is available for mineral material disposal under Alternative A (although not the 23,114 acres withdrawn). Alternative A imposes moderate limits on surface disturbance in soils with LRP, which could beneficially impact the INNS program by directing mineral materials disposals to soils with better reclamation potential, therefore making it less likely that the area of disturbance would become infested with INNS.

Alternative A opens almost all of the planning area to wind-energy development; however, it opens only 283,647 acres with high potential for commercial development. Based upon other resource conflicts, it is estimated that 2,250 acres of short-term disturbance and 1,250 acres of long-term disturbance would be developed under this alternative, with 50 turbines located on 10–8 sections. Such a development will adversely impact the INNS program by facilitating the introduction and spread of INNS.

Alternative A manages new ROWs (not associated with wind or on-lease oil and gas operations) by co-locating them with existing ROWs where possible. However, ROWs could be authorized in other locations, which would increase surface disturbance and result in potential adverse impacts to the INNS program. ROW development under Alternative A would result in 11,872 acres of short-term disturbance and 684 acres of long-term disturbance. Approximately 232 acres would be roads, with an increased risk of INNS spread. Alternative A has 66,099 acres of ROW avoidance areas and 205,916 acres of ROW exclusion areas, which would be beneficial impacts to the INNS program.

Alternative A allows livestock grazing on 2,324,934 acres of the planning area. and does not closes any acres to livestock grazing. The potential adverse impacts to the INNS program are described under *Impacts Common to All Alternatives*. Alternative A would authorize range improvement projects with approximately 860 acres of surface disturbance with increased risk of INNS spread. Alternative A also prohibits the placement of salt and mineral supplements within ¼ mile of water, wetlands, riparian areas, and reclaimed or reforested areas, which would reduce vegetation removal, soil compaction and sediment production from concentrated livestock grazing and traffic. This would beneficially impact the INNS program by preventing adverse impacts to vegetation and soil resources in those areas and limiting the introduction of INNS by grazing animals.

Alternative A does not provide for a forage reserve for livestock grazing so reclamation of surface disturbance would be more difficult if grazed by livestock which increases the risk of INNS spread.

Recreation-related adverse impacts can contribute to the introduction and spread of INNS. INNS seed and propagules can be introduced from authorized group activities, such as the repeated use of undeveloped campsites near waterbodies and cross-country mechanized travel. Alternative A closes 5,923 acres to motorized vehicle use. Seasonal restrictions on 111,002 acres would be likely to beneficially impact the INNS program, because soils will be protected during times of the year when damage to vegetation could make the area more vulnerable to INNS spread. Alternative A closes 14,729 acres to over-snow vehicle use. However, the remaining lands (virtually all of the planning area) are open without any minimum snow-depth requirements, resulting in the potential for adverse impacts to vegetation and secondary adverse impacts to the INNS program.

4.4.3.3.2.4. Special Designations

Alternative A also manages waterways identified in an inventory as eligible for inclusion in the NWSRS, which limits surface disturbance within ¼ mile of those waterways. Like any avoidance of surface disturbance, this would result in direct beneficial impacts to the INNS program, although the limited number of acres associated with this management would result in only moderate beneficial impacts.

Alternative A manages 119,622 acres of ACECs as ROW avoidance areas. This management has historically precluded major ROWs and thus avoided the adverse impacts to the INNS program associated with surface disturbance. While ACEC management also introduces the requirement for a Plan of Operations for locatable mineral actions, which would help prevent undue or unnecessary degradation, it will not stop mineral-related surface disturbance, a vector for INNS introduction and spread.

4.4.3.3.3. Alternative B

4.4.3.3.3.1. Program Management

Under Alternative B, the Authorized Officer may require that livestock be flushed for weeds (fed certified weed-free forage) for 72 hours before livestock is allowed to move onto BLM-administered lands. The intent of this short-term quarantine measure is to keep livestock from moving off private lands infested with Wyoming Declared Weeds onto BLM-administered lands. This alternative would put BLM-administered lands at lower risk of infestation from this vector. This would require that livestock operators obtain certified weed-free forage, or have their own forage crops certified by the appropriate county weed and pest control district. This alternative will help coordination between the Lander Field Office and the Casper Field Office, because the Casper Field Office adopted this specific management action in its RMP and EIS. There is no similar requirement under Alternative A, so management under Alternative B is more beneficial to the INNS program.

Under Alternative B, the Lander Field Office will monitor and determine if authorized activities are contributing to the spread of INNS. If authorized activities are creating an adverse impact due to the spread of INNS, the Lander Field Office will adjust the terms of the authorization to aid in the control of INNS. This would provide a greater beneficial impact to INNS management than Alternative A, because all activities identified as contributing to the spread of INNS would require adjustments to authorized terms, rather than making adjustments on a case-by-case basis.

4.4.3.3.3.2. Resources

Management actions under Alternative B prohibit soil-disturbing activities in areas with LRP soils, which would result in more beneficial impacts to the INNS program than Alternative A. The risk of reclamation failure and INNS invasion is greatest on LRP soils, and Alternative B restrictions would provide the greatest protection and help ensure that erosion would be kept to natural rates. This alternative eliminates the risk of land reclamation failure associated with mineral and realty actions by prohibiting these activities on LRP soils. There would still be a potential for INNS to become established on LRP soils from other activities, such as range improvement projects and livestock grazing. However, soils would remain more resistant to INNS infestation than under Alternative A in the absence of development related to mineral and realty actions.

Slopes in excess of 15 percent are closed to surface-disturbing activities under Alternative B, an increase of 231,325 acres over Alternative A. The potential for erosion becomes greater on slopes in excess of 15 percent than on less steep slopes. Steeper slopes undergo accelerated erosion and are more difficult to stabilize and reclaim, becoming suitable sites for weed infestations. Therefore, additional limitations under Alternative B would result in moderately more beneficial impacts than Alternative A.

Management actions for water resources under Alternative B limit surface disturbance on more acres than Alternative A. This would beneficially impact the INNS program, but cannot be quantified because not all of the areas have been mapped and would have to be considered on a case-by-case basis.

While Alternative A relies on label precautions and INNS treatment application restrictions near water to protect surface water and groundwater from contamination, Alternative B prohibits pesticide use in identified aquifer recharge areas and any areas underlain by a sole source aquifer or wellhead protection area. Alternative B water management would adversely impact INNS management in areas of infestation, like the Lander Slope, by placing restrictions on pesticide use beyond those specified by the EPA. Not treating new, small infestations of deep-rooted perennials on the Wyoming Declared Weed list for eradication risks permanently losing acreage of livestock forage and wildlife habitat and increasing the fire hazard from heavy weed infestations. The U.S. EPA regulates the conditions of safe use for all pesticides by specific statutory authority using the best available science to protect human health and the environment. The risk of damage to the environment from INNS is greater than the risk from properly applied pesticides.

Alternative B manages 5,490 acres of lands with wilderness characteristics as non-WSA land with wilderness characteristics to protect their wilderness character, which includes prohibiting motorized and mechanized travel. This would help to protect these lands from weed infestations. Alternative A does not designate special management for these lands, but because of the limited number of acres involved, Alternative B would be only moderately more beneficial than Alternative A.

Alternative B includes full suppression of fire and authorizes soil disturbance associated with suppression activities within limited areas, in accordance with an approved FMP. This would create surface disturbance in the areas of full suppression, providing suitable conditions for INNS invasion. However, this management approach would reduce the risk of INNS invasion in small, non-landscape-level wildfire situations by reducing impacts from heavy fire-fighting equipment. As vegetation communities return to a more natural fire frequency cycle, the risk of INNS establishment following wildfire would decrease, resulting in healthier herbaceous communities. While there is not enough information to quantify the difference, Alternative B would result in more beneficial impacts than Alternative A because of the reduced surface disturbance associated with full suppression.

Under Alternative B, short-term adverse impacts from INNS due to timber harvesting activities, similar to those described under Alternative A, would accrue as forest areas are managed according to prescriptions that will be developed in forest management plans for the Green Mountain, South Pass, Lander Slope, and Dubois Primary Forest Resource areas (Map 47). Alternative B prohibits clear-cutting. Natural forest processes would be relied on to achieve suitable forest health, with traditional silviculture techniques applied when natural forest processes fail. This would be more beneficial to the INNS program than Alternative A because it would be less likely to result in surface disturbance, although the low demand for forest products makes this only a minor beneficial impact to the INNS program under either alternative. The Alternative B prohibition on clear-cuts increases the potential for large, landscape-level wildfire. Under Alternative B, the result of landscape-level wildfire could increase erosion and the potential for INNS infestation compared to Alternative A, where small clear-cuts could be strategically located to act as fire breaks against landscape-level wildfires. Under either alternative, there would be limited demand for forest products, so the difference in impacts between the two alternatives would likely to be minor.

Riparian-wetland resources management under Alternative B closes additional acres to surface disturbance through a larger active buffer. This wide buffer and moderate restrictions on surface use would help reduce the risk of INNS invasion due to surface disturbance. Reductions in surface-disturbing activities would have an indirect beneficial impact on the control of INNS. Alternative B prohibits surface disturbance near riparian-wetland areas on approximately two and one-half time the acres than Alternative A.

Alternative B implements a passive-management-oriented, non-project approach for correcting identified PFC and/or Wyoming Standards for Healthy Rangeland deficiencies (see the *Livestock Grazing Management* section). This more passive management can work well on low slopes without compacted soils in moist locations; recovery of these areas can be realized in the short to long term. However, simply closing an eroding road without alleviating soil compaction and reseeding can be successful in some cases and very unsuccessful in others, leading to more adverse impacts from INNS invasion. The success of this approach depends on the slope, runoff, and soil material present. This is unlike Alternative A, which on a case-by-case basis uses management and projects to rehabilitate or enhance riparian zones and wetland resources that can yield desirable results sooner, depending on the level of degradation at the site.

Management actions under Alternative B designed to protect wildlife and special status species habitat from the impacts of surface-disturbing and surface-disruptive activities also serve to protect against INNS invasion. This alternative restricts and prohibits surface-disturbing activities to a much greater degree than Alternative A. In greater sage-grouse nesting areas, surface-disturbing activities are highly restricted on 1,339,609 acres, somewhat more than Alternative A. While this is only a timing restriction it does limit surface disturbance during a time that is ideal for the introduction of INNS in soils that are wet in the spring. Buffers around occupied greater sage-grouse leks prohibit surface-disturbing activities on 93,410 acres of BLM surface acres, substantially more than Alternative A.

Alternative B would systematically inventory and close unnecessary roads and trails and prescribe rehabilitation for them to benefit wildlife habitat. Comparatively, Alternative A closes and reclaims unnecessary roads and old mineral exploration trails on a case-by-case basis. Alternative B prohibits new water development projects in big game crucial winter range and parturition areas. In general, limitations on surface disturbance under Alternative B to improve wildlife and special status wildlife habitat would result in major beneficial impacts to the INNS program compared to Alternative A.

Special status species management provisions for this alternative prohibit chemical treatments within ¼ mile of BLM sensitive plant species habitat, unless the purpose is to protect the special status plant species. Also, buffers can be increased to protect plant populations on a case-by-case basis. This management could result in an increase of INNS that could ultimately out perform special status plants or adversely alter habitat for special status species. In comparison, Alternative A allows chemical treatment of vegetation in sensitive species habitat on a case-by-case basis, which could be a more effective way to remove weed threats to special status species, depending on the specific weed species involved.

Alternative B proposes the construction/upgrade of up to three wild-horse viewing loop roads. These roads would be built in accordance with BLM Manual 9113 design specifications and surfaced with crushed rock or asphalt. Short- and long-term adverse impacts would include increased risk of INNS invasion in the road ditches due to construction and increases in traffic. Increased monitoring would be necessary for these routes.

Management prescriptions under Alternative B designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and surface-disruptive activities would also protect against INNS invasion. Generally, the management of heritage and visual resources under Alternative B would provide more secondary protections for resisting INNS invasion than Alternative A.

4.4.3.3.3.3. Resource Uses

Surface-disturbing activities associated with mineral development expose soils to increased risk of INNS invasion in both the short term and long term. For projected figures of disturbance under Alternative B, see Table 2.3, "Comparative Summary of Proposed Land Use Decisions in the Lander Planning Area" (p. 32). Alternative B decreases the amount and severity of surface disturbance related to mineral development (salable, leasable, and locatable minerals; and geothermal leasing) compared to Alternative A, which would be expected to result in a corresponding decrease in risk of INNS invasion.

Alternative B opens 41,372 acres for wind-energy development; this is approximately only a of the acreage Alternative A offers on a case-by-case basis. Of these areas, only 867 acres have wind-energy potential. Accordingly, Alternative B would be unlikely to have any industrial scale wind-energy development. This would be a major beneficial impact to INNS in comparison to Alternative A. Alternative B's wind-energy development restrictions would beneficially the INNS program in comparison to Alternative A.

ROW development under Alternative B would result in approximately 7,590 acres of short-term surface disturbance and 125 acres of long-term surface disturbance. This is much less adverse than Alternative A, although some of the long-term disturbance in Alternative B would not necessarily lead to INNS because it is associated with paving roads or constructing facilities. Under Alternative B, there are 315,219 acres of ROW avoidance areas (approximately five times more than Alternative A) and 1,919,029 acres (approximately 9.3 times more than Alternative A) of ROW exclusion areas. The far more limited ROW program under Alternative B would result in major beneficial impacts to the INNS program compared to Alternative A.

Alternative B manages 12,839 more acres as closed to livestock grazing in comparison to Alternative A. The impacts of concentrated herbivory are identified in *Impacts Common to All Alternatives*. These adverse impacts would be reduced in the areas that are closed to livestock grazing in Alternative B. Alternative B prohibits the placement of salt and mineral supplements in far more areas than Alternative A with beneficial impacts to INNS by limiting vegetation loss. Furthermore, Alternative B emphasizes the use of non-structural grazing management to achieve or maintain Wyoming Standards for Healthy Rangelands. New range improvements would not be allowed that would result in adverse impacts to other resources. This approach would likely require a reduction in stocking rates and the use of alternative grazing strategies, such as herding, to prevent livestock concentrations from creating suitable conditions for INNS invasion. In addition, not only would there be no new surface disturbance, range improvement projects would emphasize vegetation treatments, increasing the acres treated from 10,000 acres over the life of the plan to 30,000. If a forage reserve were established, as authorized under Alternative B, reclamation success could be improved with beneficial impacts to the INNS program. The beneficial impacts to INNS management from livestock grazing management under Alternative B would be major compared to Alternative A.

The adverse impacts of recreation-related travel are described under Alternative A. Alternative B closes 71,761 acres to motorized vehicle travel, approximately 12 times more acres than Alternative A. Under Alternative B, approximately 116,805 acres are seasonally closed to motorized vehicle travel, somewhat more than under Alternative A. To the extent that seasonal closures protect vegetation during muddy seasons, there would be less vegetation disturbed, a beneficial impact to the INNS program. Alternative B closes approximately 181,173 acres to over-snow vehicle use, approximately 12 times more than Alternative A, and limits travel when there are less than 12 inches of snow, which would limit adverse impacts to vegetation and, indirectly, result in beneficial impacts to the INNS program. With more restrictions on travel, there would be fewer chances for INNS seed and propagule introduction and less surface disturbance to create favorable conditions for INNS germination.

4.4.3.3.3.4. Special Designations

Alternative B management associated with Congressionally Designated Trails would result in major beneficial impacts to INNS management compared to Alternative A because Alternative B places far more restrictions on surface-disturbing activities. It is not possible to quantify the acres that would not be disturbed under Alternative B because trails management is based on the trail's visual and historical setting. However, the restrictions are extensive under Alternative B and would limit the kinds of disturbances (surface disturbance and new roads) that are the major vectors for INNS spread.

Alternative B manages all NWSRS-eligible waterways as suitable for inclusion in the NWSRS, while Alternative A recommends that interim management continue for the nine NWSRS-eligible waterways. Managing the Sweetwater River Unit to maintain its NWSRS suitability would not provide additional beneficial impacts because it is part of a WSA with more restrictive management. In the other waterways, while theoretically there would be a beneficial impact to the INNS program from WSR suitability management under Alternative B, there is little demand for surface-disturbing activities in these areas, so there would be no real difference in impacts to the INNS program between alternatives A and B.

Alternative B designates 1,492,990 acres as ACECs and prohibits or minimizes surface disturbance in these areas. This is approximately 12.5 times the acreage protected under Alternative A. However, a large portion of these acres overlap with other restrictions so the acres of protection analyzed here are not additive.

4.4.3.3.4. Alternative C

4.4.3.3.4.1. Program Management

INNS program management under Alternative C is the same as under Alternative A. As described above, Alternative B includes more proactive management, such as cattle flushing and adjusting terms and conditions of authorized activities, to help control INNS. Therefore, alternatives A and C would result in less beneficial impact to INNS management than Alternative B.

4.4.3.3.4.2. Resources

Alternative C soils, water, and fire program management are similar to that under Alternative A. Like Alternative A, Alternative C avoids surface-disturbing activities on slopes more than

25 percent with the same beneficial impacts to the INNS program. This is much less restrictive than Alternative B, which avoids surface-disturbing activities on slopes more than 15 percent, the avoidance requirement with the highest level of restrictions. Impacts to the INNS program from soils management under Alternative C would be very similar to impacts under Alternative A, and more than moderately less beneficial than under Alternative B.

Alternative C management of forest product sales is generally the same as Alternative A, but less restrictive and with more potential for adverse impacts to the INNS program than Alternative B. Alternative C prescriptions that allow for large clear-cuts would result in more short-term adverse impacts from the risk of INNS invasion until logged sites could grow native vegetative cover that can resist INNS invasion. Alternative C would result in the greatest long-term adverse impacts of INNS invasion in any portions of large clear-cuts that lose soil fertility and do not rehabilitate in the short term. However, because of the lower demand for forest products, differences in impacts among the alternatives would be minor.

Alternative C riparian-wetland management actions are very similar to Alternative A, with similar moderate beneficial impacts.

Alternative C places the fewest restrictions on surface-disturbing activities based on wildlife and special status species concerns. Therefore, Alternative C would be expected to result in a greater degree of development in critical wildlife habitats, and in turn result in the highest potential for INNS introduction and establishment compared to the other alternatives. In greater sage-grouse nesting areas, Alternative C prohibits surface-disturbing activities the same as Alternative A. Alternative C has the same nesting stipulations as Alternative A, which is less beneficial to soils and thus INNS management during a vulnerable season. Alternative C management of wildlife resources does not close and reclaim unnecessary roads and old mineral exploration trails, unlike Alternative A, which does on a case-by-case basis, and Alternative B, which requires more active identification and rehabilitation of redundant and hazardous roads. Addressing these road-related erosion problems through rehabilitation denies INNS preferred germination sites.

Alternatives A and C provide for greater control of INNS species compared to Alternative B because chemical (pesticide) use is not limited. The impact of this different management would be minor because of the limited mapped acres of special status plant species.

Management prescriptions under Alternative C designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and surface-disruptive activities also protect against adverse impacts associated with INNS introduction and infestation. Generally, Alternative C would provide the least secondary protections for resisting INNS invasion compared to alternatives A and B, which would provide the most protection for resisting INNS invasion. Alternative C includes very limited restrictions on surface disturbance to protect these resources (particularly visual resources), so more surface disturbance would be likely under Alternative C, with major adverse impacts to the INNS program.

4.4.3.3.4.3. Resource Uses

Surface-disturbing activities associated with mineral development expose areas to increased risk of INNS introduction and infestation. For potential short- and long-term acres affected and acres of disturbance under Alternative C, see Table 2.3, “Comparative Summary of Proposed Land Use Decisions in the Lander Planning Area” (p. 32). Alternative C increases the amount and severity of surface disturbance related to all mineral development (locatable, leasable and mineral material disposals) compared to alternatives A and B, which would be expected to result in an increase in risk of INNS invasion, a major adverse impact.

Alternative C opens more acres with wind-energy potential to wind-energy development and has fewer acres of avoidance or exclusion. It is assumed that there would be 108,000 acres of short-term disturbance and 48,000 acres of long-term disturbance, the most of any alternative. This alternative would have adverse impacts as the development would be spread across 400 or more sections.

Alternative C designates future major ROWs in a 3 mile-wide corridor that follows existing ROWs totaling approximately 660,908 acres in designated corridors. Surface disturbance for ROWs (other than on-lease oil and gas and wind-energy development) would be 12,216 acres of short-term disturbance and 703 acres of long-term disturbance or slightly more than Alternative A. Alternative C excludes ROWs on 147,053 acres thus protecting far fewer acres from INNS disturbances in comparison to Alternative B. Alternative C manages 11,714 acres as ROW avoidance areas. INNS can still become established in ROW exclusion and avoidance areas by means of livestock, wildlife, and range improvement projects, among others. Alternative C ROW management is likely to have at least moderately more adverse impacts than either Alternative A or B.

Like Alternative A, Alternative C opens the planning area to livestock grazing with very similar management. Alternative C calls for moderate grazing (41 to 60 percent) rather than setting utilization levels on a case-by-case basis, as does Alternative A, or by prescribing light (20 to 40 percent) utilization levels as does Alternative B. Moderate utilization would necessarily require more monitoring and leave less room for error than light utilization, and would present a risk of more adverse impacts to plant communities, which can favor INNS invasion. The acres open to grazing under this alternative and its utilization levels (moderate) are the same as Alternative A. Alternative C would have 1,996 acres of long-term surface disturbance associated with range development projects. Alternative C management of the placement of salt and mineral supplements is the same as Alternative A; however, unlike Alternative A, Alternative C uses salt and mineral supplements as a tool to maximize forage use. Like Alternative A, the development of range infrastructure would limit vegetation treatments to approximately 10,000 acres over twenty years or 1/3 the acres of treatment under Alternative B. Alternative C would result in the greatest adverse impacts to vegetation from livestock grazing compared to the other alternatives, and consequently would result in the greatest adverse impacts from INNS invasion.

Alternative C closes 5,472 acres to motorized vehicle travel, more closely resembling Alternative A than Alternative B in the beneficial impacts to the INNS program. Alternative D includes seasonal closures similar to Alternative A, but less than Alternative B. Seasonal closures designed to benefit wildlife can also benefit vegetation by reducing the likelihood of INNS spread. Alternative C is similar to Alternative B in its management of over-the-snow vehicles by requiring motorized vehicles to stay on roads unless there are at least 12 inches of snow, which would beneficially impact vegetation and, therefore, beneficially impact INNS management.

4.4.3.3.4.4. Special Designations

Alternative C management of Congressionally Designated Trails restricts surface disturbance on the fewest acres of any alternative. Compared to Alternative B, Alternative C allows greater development outside ¼ mile of trails and would have the potential to result in major adverse impacts to the INNS program.

Alternative C does not recommend any NWSRS-eligible waterway segments as suitable for inclusion in the NWSRS. This would result in fewer protections against surface-disturbing activities and INNS invasion than alternatives A and B.

Alternative C does not designate any ACECs. The alternative manages surface-disturbing activities with standard stipulations, which is the least restrictive to surface-disturbing activities of all the alternatives and provides the least protection against the risk of INNS introduction. Standard stipulations would provide some level of protection against the potential infestation of INNS; however, Alternative C standard stipulations would do little to hinder the spread of INNS compared to Alternative B, with resulting major adverse impacts. Alternative C would also result in fewer beneficial impacts to INNS management than Alternative A.

4.4.3.3.5. Alternative D

4.4.3.3.5.1. Program Management

INNS program management under Alternative D is generally the same as under Alternative B. However, Alternative D includes fewer restrictions on surface disturbance than Alternative B, which would make the beneficial impacts under Alternative D moderately to substantially less than Alternative B. Alternative D better prevents the introduction and spread of INNS than alternatives A and C.

4.4.3.3.5.2. Resources

Soils and water program management under Alternative D is similar to that under Alternative A in terms of slope and LRP. Impacts under this alternative would be expected to be very similar to those described for Alternative A and less than those under Alternative C.

Alternative D includes full suppression of fire based on a consideration of other resources. This management would be more likely to lead to INNS spread than Alternative B, where soil disturbance associated with suppression activities occurs. Alternative D would result in more acres of disturbance from fire suppression activities than Alternative B, but it is not possible to quantify this difference.

Alternative D management of forest product sales allows all silvicultural management techniques wherever they are deemed suitable. This would be a more beneficial approach to INNS management than any of the other alternatives because it accounts for site-specific considerations and does not impose artificial limits. This alternative avoids the potential for INNS expansion into clear-cut areas that occurs under alternatives A and C, but would provide more management flexibility than Alternative B. Alternative D also allows management flexibility to address beetle-killed trees in parts of the planning area and allows the BLM to partner with other land managers, such as the U.S. Forest Service (USFS) in the Shoshone National Forest. This management can also be used strategically, as funds permit, to perform fuels treatments that would help prevent landscape-level fires. However, the low demand for forest products would make the importance of differences in impacts among the alternatives minor to moderate.

Riparian-wetland management actions under Alternative D are the same as those under Alternative A, which would afford native plant communities some short- and long-term protection from potential INNS introduction and infestation, but not as much protection as Alternative B, which closes a much larger buffer (125,403 more acres). Alternative D allows the use of infrastructure projects to make progress toward PFC and Wyoming Standards for Healthy Rangelands, but balances adverse impacts to resources. Additional information regarding livestock grazing management impacts to INNS is provided below under that section.

Alternative D places more restrictions on surface-disturbing activities for the protection of wildlife and special status species than alternatives A and C, but not as many as Alternative B. Accordingly, adverse impacts under Alternative D from INNS establishment and spread would be less than those under alternatives A and C, but more than those under Alternative B. Restrictions on surface disturbance due to special status species would limit the amount of bare ground allowed, particularly in the greater sage-grouse Core Area, and therefore would decrease potential locations for INNS establishment. The Alternative D closure of the Dubois area to surface-disturbing activities (e.g., oil and gas development, phosphate leasing, mineral materials disposals, and major ROWs to protect wildlife) would reduce the potential for INNS spread in the area by reducing surface disturbance. However, the Dubois area has not historically been an area of intensive mineral development, so beneficial impacts to the INNS program could be minor.

Like Alternative B, Alternative D closes and reclaims redundant and hazardous roads and old mineral exploration trails. Addressing these road-related erosion problems through rehabilitation would deny INNS preferred germination sites and therefore would result in more beneficial impacts to INNS management than Alternative A, which closes and reclaims redundant and hazardous roads and old mineral exploration trails on a case-by-case basis. Alternative C provides the least protection for special status species, alternatives A and D provide a mid-level of protection, and Alternative B provides the most protection to special status species and by imposing the most restrictive limits for surface-disturbing impacts.

Alternative D authorizes chemical (pesticide) treatments within identified sensitive species plant habitat if it would benefit the special status plants. This is unlike Alternative B, which prohibits chemical treatments within ¼ mile of BLM sensitive plant species habitat, unless the purpose is to protect the special status plant species. Alternative D management could reduce the likelihood of INNS, which could ultimately out perform special status plants or adversely alter habitat for special status species. Alternative A allows chemical treatment of vegetation within sensitive species habitat on a case-by-case basis. Alternatives A, B, and C are very similar, because all weed control is reviewed on a case-by-case basis. To safeguard sensitive species populations against accidental pesticide treatment, the Fremont County Weed & Pest Control District has information about sensitive plant populations and boundaries in the planning area in their Geographic Information System (GIS), which is readily available to field work crews. Alternative D provides for the greatest control of INNS followed by alternatives A and C and finally Alternative B which has the least flexibility for treatment of INNS.

Management prescriptions under Alternative D designed to protect cultural, paleontological, and visual resources from the impacts of surface-disturbing and surface-disruptive activities also protect against adverse impacts associated with INNS introduction and infestation. Generally, this alternative provides the second best management (limiting surface-disturbing activities) for resisting INNS invasion compared to Alternative B, but more than Alternative A or C.

4.4.3.3.5.3. Resource Uses

Surface-disturbing activities associated with mineral development expose areas to increased risk of INNS introduction and infestation. For potential short-term and long-term acres affected and acres of disturbance under Alternative D, see Table 2.3, “Comparative Summary of Proposed

Land Use Decisions in the Lander Planning Area" (p. 32). Alternative D would decrease the amount and severity of surface disturbance related to mineral development (locatables, leasables, and mineral material disposals) compared to Alternative A, and would decrease them substantially compared to Alternative C but less than Alternative B.

Alternative D manages 58,536 acres with wind-energy potential open to wind-energy development compared to Alternative B on which one project with 50 turbines is expected to be developed. This would have the same impacts as described under Alternative A, which anticipates the same number of turbines. Alternative D includes 961,696 acres of avoidance area and 972,794 acres of exclusion area which is beneficial to INNS.

Alternative D assumes that 9,894 acres would have short-term disturbance associated with ROW (other than oil and gas on-lease and wind-energy development). Alternative D confines major ROWs to designated corridors (53,599 acres). These designated corridors are fewer and narrower under Alternative D than under Alternative C, but more areas are available than under Alternative B. This would limit surface disturbance through many areas of resource concern and limit this potential vector for INNS spread, but less than under Alternative B.

Alternative D includes a potential 53,599 acres in designated ROW corridors that could be disturbed during the planning period. Alternative D excludes ROWs on 829,332 acres, approximately half as many acres as Alternative B. Alternative C does not exclude ROWs in any areas as opposed to Alternative A which avoids ROWs on 66,099 acres. The amount of disturbance that would actually result from ROWs cannot be determined because that would depend in part on development. However, considering both the acres where ROWs are excluded and the designation of ROW corridors, Alternative B would be most likely to avoid adverse impacts from INNS, followed by Alternative D, then alternatives A and C. However, INNS can still become established in these exclusion and avoidance areas by means of livestock and wildlife, and range improvement projects, among other causal factors.

Alternative D manages 6,313 acres as closed to livestock grazing, slightly less than Alternative B and slightly more than alternatives A and C. Alternative D livestock grazing management is less restrictive than Alternative B because Alternative D allows moderate utilization levels. Limiting range infrastructure projects to when part of a Comprehensive Grazing Strategy would result in fewer adverse impacts to the INNS program than alternatives A and C. Alternative D would likely make more rapid progress towards rangeland health than Alternative B but this could be offset by the additional surface disturbance associated with the infrastructure. Alternative D will disturb 847 new acres whereas Alternative B will likely disturb little to none. Like alternatives A and C, Alternative D would treat 10,000 acres or 1/3 that of Alternative B. However, in cases where livestock use would be continuous or occur annually during the critical growing season for uplands or during the riparian-wetland hot seasons, light utilization levels could be necessary. Utilization levels would be based on the results of monitoring data. Under Alternative D, forage requirements for big game herd objectives are considered when determining stocking rates for livestock and wild horses. Because healthy herbaceous communities are more resistant to INNS infestation, moderate livestock grazing in uplands and riparian-wetland systems would result in beneficial impacts by reducing over utilization and the potential for INNS establishment as herbaceous communities return to a stable state. Alternative D restricts the placement of salt and mineral supplements similar to Alternative B, which would result in beneficial impacts to INNS management similar to those under Alternative B. While these beneficial impacts would be more pronounced under Alternative D than under Alternative A, and exceed those under Alternative C, they would not be as widespread or effective as beneficial impacts under Alternative B.

Roads and trails are prime vectors for INNS invasion and the less acreage open to motorized vehicle travel the less chance there would be for the introduction of INNS. Alternative D closes 25,425 acres to motorized vehicle travel, far less than Alternative B but similar to Alternative A. Alternative D includes seasonal closures similar to Alternative A but less than Alternative B. Seasonal closures for wildlife management would also have beneficial impacts on vegetation and, therefore, reduce the likelihood of INNS spread. Alternative D is similar to Alternative B in its management of over-snow vehicle travel, as it requires motorized vehicles to stay on roads unless there are at least 12 inches of snow; this would beneficially impact vegetation and, therefore, have a beneficial impact INNS management.

4.4.3.3.5.4. Special Designations

Alternative D management of Congressionally Designated Trails would result in more beneficial impacts to INNS management than alternatives A and C, because Alternative D includes more restrictions on surface disturbance over a larger area. However, Alternative D would result in substantially fewer beneficial impacts than Alternative B, because Alternative D closes less area to surface-disturbing activities.

Alternative D protects fewer NWSRS-eligible waterway segments by managing them as suitable for inclusion in the NWSRS than Alternative B, but this would result in only a marginally less beneficial impact to INNS management because many of the segments are protected by other management (e.g., ACEC WSA designation). Moreover, it is not clear that there would be any real demand for surface-disturbing activities in these areas, so there might be only minor differences in impacts among alternatives A, B, and D. The Alternative C approach of not recommending any NWSRS-eligible waterway segments as suitable could result in more adverse impacts because of the lack of restrictions associated with special designations realized under the other alternatives.

Alternative D designates 245,037 acres of ACECs, which in turn have limits on surface disturbance. As discussed above, ACEC designation requires a Plan of Operations for locatable mineral activities regardless of disturbance acreage, which includes a weed management plan. This would beneficially impact INNS management, although not to the extent of the withdrawals proposed under Alternative B.

4.4.4. Riparian-Wetland Resources

Impacts to riparian-wetland resources occur when something alters the physical, chemical, or biological components of the ecosystem. Actions that contribute to the decline in abundance, distribution, or functionality of riparian-wetland resources are considered adverse impacts. Conversely, beneficial impacts result from management actions that protect or restore riparian-wetland resources in the planning area.

Direct impacts to riparian-wetland resources result from disturbing vegetation or the ground surface in these communities. Indirect impacts result from actions in a watershed that cause a change in riparian-wetland functionality (e.g., increased rates of sediment loading or changes in hydrology), a change in water chemistry, or spread of INNS.

4.4.4.1. Summary of Impacts

Major adverse impacts to riparian-wetland resources arise from surface disturbance associated with mineral resources development, motorized vehicle use, road construction, and livestock grazing. Impacts from wildlife and wild horses are more localized and site specific than the broad impacts from livestock grazing. Alternative C would result in the greatest projected total surface disturbance, followed by Alternative D, Alternative A and then Alternative B. Alternative B would result in the greatest beneficial impact to riparian-wetland resources by imposing more restrictions on surface-disturbing activities close to riparian-wetlands resources and by instituting more beneficial proactive management actions, such as watershed improvement projects. Overall, Alternative B would result in the fewest adverse impacts to riparian-wetland resources and Alternative C would result in the most. Alternative D has moderate beneficial impacts to riparian-wetland resources over alternatives A and C, but less than Alternative B.

4.4.4.2. Methods and Assumptions

Evaluating potential impacts to riparian-wetland areas caused by changes in functionality or INNS establishment focuses on resource management actions that (1) cause surface disturbances or limit impacts from surface disturbances and (2) are substantially different among the proposed alternatives. Estimates of projected surface disturbances are used as the primary metric for determining the relative level of potential indirect impact to riparian-wetland areas.

Methods and assumptions used in this impact analysis include the following:

- Where appropriate actions have been applied following rangeland health assessments, riparian-wetland plant communities are functioning properly or are in the process of achieving PFC.
- Surface disturbances generally increase the potential for accelerated sediment loading to streams.
- Surface disturbances generally increase surface runoff to streams due to an increase in impervious surface, changes in water routing, and loss of vegetation.
- Surface disturbance, transportation networks, ungulate use, and recreation increase the likelihood of INNS introduction and spread in an area.
- The greater the amount of surface disturbance in a watershed, the greater the probability that excess surface runoff and sediment will enter the stream and contribute to the loss of riparian-wetland functionality.
- Placing salt and mineral supplements outside riparian-wetland communities is a tool that can reduce livestock use of riparian-wetland areas.
- Surface runoff to streams generally increases as livestock stocking rates increase. This is not a linear relationship. For example, low stocking rates typically result in no measurable impact to surface runoff, moderate stocking rates typically result in a negligible impact to surface runoff, high stocking rates result in a measurable impact to surface runoff, and consecutive years of high stocking rates have the highest potential for increasing surface runoff to streams.
- Livestock use is typically disproportionately higher in riparian-wetland communities than in upland communities. Improper livestock grazing management can adversely impact riparian-wetland communities throughout the year, but generally there are more impacts in spring and early summer when soils are wet and, therefore, more vulnerable to compaction, and stream banks are more vulnerable to sloughing. Livestock, especially cattle, tend to congregate in these communities during the hot season (mid through late summer). While

stocking rates for an allotment or pasture might be low to moderate, the utilization levels in riparian-wetland areas can be high.

- Riparian-wetland areas are managed to meet PFC and Wyoming Standards for Healthy Rangelands. Meeting these standards depends primarily on management of grazing practices and ground-disturbing activities. Riparian-wetland areas are evaluated during Wyoming Standards for Healthy Rangeland assessments. Approximately 5 percent of the public land in the planning area is evaluated annually for rangeland health. The BLM assesses riparian-wetland sites on BLM-administered land using the PFC method. The BLM manages livestock and implements rangeland improvement projects to endeavor to bring locations not in PFC into PFC, where conditions allow.
- Livestock numbers are managed on an annual basis based on livestock permittees operations, available forage, and permitted seasons of use.
- Wildlife can adversely impact riparian-wetland areas, depending on the numbers and types of wildlife and when the use occurs; however, impacts from wildlife are more localized and site specific and are not widespread in the planning area.
- All riparian-wetland areas are managed toward PFC. Management toward desired plant community is assumed to exceed the requirements of managing toward PFC.
- Management actions for soil resources will help minimize soil erosion, and sediment, salt, and nutrient loading in waterbodies.
- Stream channel and land health conditions can degrade quite rapidly. Recovery is often a much slower process. It is generally more efficient to prevent degradation than to recover a degraded system.

4.4.4.3. Detailed Analysis of Alternatives

4.4.4.3.1. Impacts Common to All Alternatives

Impacts to riparian-wetland resources would be similar, but the intensity of impacts would vary by alternative.

Implementing any of the alternatives could result in direct and indirect impacts. Because riparian-wetland areas are limited in the planning area and often the most productive lands; humans, livestock, wild horses, and wildlife disproportionately impact these resources compared to the same types and extent of actions in upland areas. Whenever possible, the alternatives generally avoid or minimize direct adverse impacts to riparian-wetland. Impacts from projects or uses that involve riparian-wetland areas are minimized through the application of BMPs. In addition, the BLM manages lotic (running water) and lentic (standing water) riparian-wetland areas to meet PFC and Wyoming Standards for Healthy Rangelands.

Under all the alternatives the BLM uses wildland fires to restore fire-adapted ecosystems and to reduce hazardous fuels. However, it is likely that several resource objectives throughout the planning area will require the use of full suppression tactics in most cases. The loss of vegetative cover from both wildland fires and prescribed fires increases runoff and sediment to streams and other waterbodies in the short term. Storm events following a fire can overwhelm downstream waterbodies by contributing excessive amounts of sediment, large woody debris, and water to the system in a short period. Fires that burn more intensely result in a greater adverse impact to the watershed. Fires of the appropriate intensity generate a vegetation response that could result in beneficial impacts to a watershed by helping to recharge water tables and increasing the amount of herbaceous cover, thereby improving livestock, wild-horse, and wildlife distribution and decreasing erosion.

Direct adverse impacts to riparian-wetland resources can result from wildlife, livestock, wild-horse grazing, and linear disturbances such as roads and pipelines. The alternatives stipulate BMPs to address these impacts. These BMPs are particularly important for livestock management. All alternatives stipulate varying riparian buffers to reduce impacts to riparian-wetlands. Locatable mineral activities are not subject to riparian buffer stipulations. Produced water discharge is permitted under all alternatives by the Wyoming Pollutant Discharge Elimination System (WYPDES). Impacts caused by wildlife and wild horses are not specifically managed but are generally minor.

Riparian-wetlands typically experience the highest adverse impacts during the hot summer seasons (June 15 through September 15) when livestock tend to loiter and select these areas for the higher-quality forage, open water, and thermal cover they provide. If improperly managed, livestock can directly impact bank stability in lotic systems, affect water quality, limit the growth and vigor of riparian-wetland herbaceous communities, and create hummocking leading to soil compaction. Riparian-wetland soils are sensitive to hummocking and compaction, which decreases water infiltration rates and water-holding capacity. Properly functioning riparian-wetland zones are often comprised of a diverse mix of woody and herbaceous riparian-wetland species. These communities are highly dependent on slope, aspect, soil type, and ecological site and can be dominated by either herbaceous species, woody species, or both. Woody species often encountered in riparian-wetland areas include cottonwood, willow, waterbirch, and alder.

In some parts of the planning area, aspen is also a component of riparian-wetland areas. The herbaceous component associated with properly functioning riparian-wetland areas is often comprised of sedges, tufted hairgrass, rushes, and bulrushes. Heavy use of these systems suppresses the reproduction of these riparian-wetland-obligate species and can lead to a shift to a more grazing-resistant plant community such as bluegrass, mat muhly, dandelions, and pussytoes. These annual species lack the root mass capable of withstanding large flow events, leading to bank shearing, and either widening of the channel or headcutting. As these alterations to channel morphology occur, riparian-wetland areas lose their ability to hold moisture, leading to encroachment by upland vegetation species. Over use of upland forage can lead to increases in overland flow, contributing to excessive sedimentation in riparian-wetland areas. Grazing management strategies, such as rotation, deferment, seasonal rest, and the manipulation of season of use and grazing intensity, are implemented to manage vegetation composition, cover, and vigor to maintain or achieve Wyoming Standards for Healthy Rangelands and PFC in riparian-wetland areas.

Wild horses are managed to maintain appropriate management levels in balance with forage resources and herd objectives. Uncontrolled herd populations adversely impact riparian-wetland areas in the form of decreased bank stability, decreased water quality, and hummocking resulting from congregation in these areas and improper livestock grazing management in riparian-wetland areas. Management of wild horses to maintain appropriate management levels would prevent over use of riparian-wetland areas. An additional long-term impact to riparian-wetland systems in HMAs is the “mudding up” that wild horses practice in wild-horse congregation areas. Wild horses create a “wallow” in some areas to cover themselves with mud to protect them from flies. Impacts in wallow areas would be minor, but would occur and would denude the sites of vegetation. Wild horses congregating in riparian-wetland areas tend to chase cattle away, which has a beneficial impact on riparian-wetland areas by reducing forage use by grazing livestock; however, these occurrences are localized and not widespread. As horse populations increase, wallows increase in number and impacts to riparian-wetland areas in HMAs increase.

Linear features such as pipelines, roads, and fences also result in direct adverse impacts to riparian-wetland areas; they impact bank stability and contribute to a high degree of sedimentation and water flow routed directly to the riparian-wetland areas. The loss of vegetation capable of dissipating water energy, compounded with soil compaction related to energy development, would lead to increased runoff and sedimentation in riparian-wetland areas. Increases in direct water flow can result in headcutting and excessive erosion in some portions of the riparian-wetland area. Conversely, additional sedimentation in the riparian-wetland area can lead to more deposition and braiding of the stream system. INNS are often introduced to riparian-wetland areas via these linear actions and they take advantage of new surface disturbance, with the potential to outcompete native riparian-wetland vegetation for soil and water resources. Species such as tamarisk, Russian olive, leafy spurge, Russian knapweed, and hoary cress have the potential to dominate riparian-wetland areas and take the place of native sedges, cottonwoods, and willows. INNS species generally lack the necessary root mass to bind the soil that is typically associated with riparian-wetland-obligate species, which can lead to headcutting and excessive erosion. Designated ROW corridors would concentrate new disturbance in areas of existing disturbance, preventing new unmitigated impacts to riparian-wetland areas.

Indirect impacts to riparian-wetland resources would result primarily from sedimentation flow into the riparian-wetland zone. While most surface-disturbing activity would not occur near riparian-wetland areas, these areas could experience indirect impacts due to soil compaction, loss of vegetative cover, and erosion in the uplands, causing increases in sediment released into streams. Higher sediment loading entering a stream could alter its form and, consequently, the performance of adjacent riparian-wetland resources. The impact of increased sediment loading depends on the stream's ability to pass the sediment through the system and largely depends on the size (discharge volume) of the stream and the channel slope gradient. In segments of a stream with lower gradients, deposition occurs and the stream channel aggrades (builds), possibly becoming braided and shallow. In some cases, aggradations of the streambed at one location can cause the stream to down cut or degrade (become more incised) in upstream reaches as the stream seeks to restore its equilibrium. The additional material eroded from the upstream channel is transported down to the a depositional area and the cycle continues. In such cases, the functionality of the riparian-wetland areas in both the aggraded stream reach and the incised stream reach change.

The BLM manages riparian-wetland habitat for several special status species, including a variety of different raptors, plants, amphibian, and fish species. Management of habitats critical for these special status species generally involves restricting activities in the vicinity of riparian-wetland areas or, in the case of wildlife, year-round or seasonal restrictions. As a result, the extra protections associated with these species can result in beneficial impacts to riparian-wetland areas in the vicinity of buffer zones for special status species.

Similar to wildlife and fisheries, management actions designed to protect cultural resources from the impacts of surface-disturbing activities would also protect riparian-wetland resources from these activities.

Impacts to riparian-wetlands as a result of surface disturbance associated with locatable mineral development would be the same under all alternatives, notwithstanding the difference in acres withdrawn from mineral entry under each alternative. Withdrawals would not impact existing claims and it is assumed that the most viable or likely areas for mineral development have already been claimed. While it is possible that changing markets could change what is determined by industry to be economically viable, for analysis purposes each alternative assumes 109 acres per year of short-term (3 to 5 years) disturbance and 95 acres per year of long-term disturbance. These numbers are based on actual data from the last 2 decades.

Locatable minerals are not subject to established or proposed buffers for riparian-wetland areas. Consequently, there would be a potential for adverse impacts to riparian-wetland areas in the form of altered stream channels, degraded bank stability, and the removal of hydric soils and riparian-wetland vegetation. Surface-disturbing activities in riparian-wetland areas are generally mitigated on or off the sites. Net acres of riparian-wetland areas lost or mitigated are not available at this time; however, impacts related to lost and mitigated riparian-wetland areas are best analyzed on a site-specific basis.

4.4.4.3.2. Alternative A

4.4.4.3.2.1. Program Management

Program management under Alternative A consists of managing riparian-wetland areas to meet PFC and prohibiting surface-disturbing activities within 500 feet of surface water and riparian-wetland areas. Management actions designed to improve streams and conserve riparian-wetland areas generally result in long-term beneficial impacts to riparian-wetland resources. Site-specific management actions such as fencing, deferred use, resting, and road closures are implemented to maintain and meet PFC for riparian-wetland systems. Man-made barriers such as fences generally result in the greatest immediate impact to riparian-wetland areas that do not meet PFC by minimizing livestock and wildlife grazing, and thus eliminating the greatest adverse impact to riparian-wetland areas. However, fencing all riparian-wetland areas would not be a practical management strategy, and fences result in a number of adverse impacts to wildlife (see the *Fish and Wildlife Resources – Wildlife* section). On a case-by-case basis, the BLM will give management priority to actions that would benefit riparian-wetland areas in the Sweetwater watershed that do not meet PFC. The riparian-wetland resources in the Beaver Rim area would be managed with standard riparian setbacks and no watershed monitoring would be required. Alternative A range improvement projects would be anticipated to disturb more acres than Alternative B, but fewer than Alternative C. While these treatments could result in short-term impacts in terms of surface disturbance, they would be expected to result in long-term beneficial impacts to these areas.

4.4.4.3.2.2. Resources

Alternative A does not specifically manage lands with wilderness characteristics to maintain their wilderness character.

Alternative A manages grasslands and shrublands to meet Wyoming Standards for Healthy Rangelands. Grasslands and shrublands that meet Standards for Healthy Rangelands promote healthy herbaceous communities capable of stabilizing upland soils, dissipating water-flow energy, and increasing water infiltration rates and water holding capacity. Healthy grasslands and shrublands minimize sedimentation and excessive water flow into riparian-wetland areas, promoting PFC. Conversely, degraded grasslands and shrublands allow for increased overland flow and sediment movement. Degraded grasslands and shrublands contribute to increased erosion and sedimentation in riparian-wetland areas until they are improved to meet Wyoming Standards for Healthy Rangelands.

Alternative A management of forest and woodlands for the promotion of timber products would have the potential to result in increased surface disturbance associated with access roads and timber removal operations. This activity could result in a return to an early seral-stage plant community comprised primarily of annual species. As discussed under *Impacts Common to All Alternatives*, annual species lack the root mass necessary for proper soil stabilization, leading to the potential of increased erosion rates and contributions of excess sediments to the riparian-wetland areas. Alternative A allows clear-cut operations within 100 feet of riparian-wetland areas and on slopes of as much as 45 percent, further resulting in the potential for excessive erosion and sediment movement into riparian-wetland areas. Appropriate management of forest products to maintain and improve forest and woodland health would promote watershed health by providing adequate vegetation to dissipate water energy and minimize sediment movement. Market conditions suggest that there would be negligible to minor impacts to riparian-wetlands because of a lack of demand for products.

INNS are particularly undesirable in riparian-wetland areas because they do not have the same high level of soil-binding properties of many native riparian-wetland species (e.g., willows and sedges). The proximity of surface disturbances to riparian-wetland areas is one of the primary ways in which INNS can spread to these areas. Prohibiting surface disturbance within 500 feet of riparian-wetland areas would help reduce the opportunity to spread INNS to these areas. INNS management under Alternative A does not restrict any kind of chemical application near riparian-wetland areas. Application of chemicals near water could reduce water quality, which would adversely impact the health of riparian-wetland resources.

Management actions under Alternative A designed to protect wildlife and special status species habitat from the impacts of surface-disturbing and surface-disruptive activities would also protect riparian-wetland resources from the impacts of these activities. For example, applying NSO and CSU restrictions in crucial wildlife habitat would reduce the chance of sediment loading into streams in these areas. Other beneficial impacts would include restoring streams and fisheries habitat on a case-by-case basis, which would result in a direct beneficial impact to riparian-wetland areas. Alternative A limits surface disturbance within ¼ mile of greater sage-grouse leks, but the degree of beneficial impact of this management would depend on the amount of riparian-wetland areas within ¼ mile of leks.

4.4.4.3.2.3. Resource Uses

The projected number of wells and associated surface disturbance under Alternative A is the second highest of the alternatives, resulting in an estimated disturbance over the planning period of approximately 22,475 acres of initial disturbance and approximately 11,706 acres of long-term disturbance from oil and gas development. Of this projected disturbance, 15,405 acres of initial disturbance and approximately 7,995 acres of long-term disturbance would be from federal wells; the remainder of the disturbance would be associated with wells on state and private lands. It is possible that riparian-wetland resources would be adversely impacted in the Beaver Rim area by the 500 foot exclusion zone and lack of watershed monitoring.

While Alternative A prohibits surface-disturbing activities associated with mineral development within 500 feet of riparian-wetlands, these activities, including well pad construction, pipeline development, road construction, and gravel pit development and use, in upland areas could increase sediment loading in streams.

Wells, pipelines, and facilities situated close to riparian-wetland resources would have the potential to contribute produced water of varying quality and hydrocarbons directly to the riparian-wetland areas in the event of a spill, contaminating riparian-wetland soils and resulting in adverse impacts to vegetation and water quality. Alternative A allows the surface discharge of produced water if it meets State of Wyoming water quality standards and is permitted by the state. Produced water from oil and gas development would represent a new water source in a watershed that augments existing water flows.

If produced water from CBNG or conventional gas development was disposed of on the surface, there could be impacts to riparian-wetland vegetation. These impacts could be beneficial due to increased water quantity that could have a beneficial impact on riparian-wetland vegetation or create new riparian-wetland areas. Any new riparian-wetland areas resulting from the discharge of produced water would depend entirely on continued discharge of produced water. It is possible that the reduction or termination of produced-water flow would adversely impact riparian-wetlands in the long term; that is, riparian-wetlands might not return to predisturbance conditions, which could lead to the introduction of INNS.

The chemistry of produced water would have the potential to change not only the vegetative community, but also soil chemistry. Upon ultimate recovery of the mineral resource and the end of production operations, these newly created riparian-wetlands would no longer have the steady source of water necessary to maintain the riparian-wetland-obligate vegetation species. The loss of hydrology, compounded by modifications to the soil chemistry, would create ecological conditions that are often difficult to reclaim to an upland herbaceous community or the ecological plant community present before the discharge of produced water. Newly created riparian-wetlands would ultimately provide only a temporary potential beneficial impact. Conversely, increasing water quantities into existing riparian-wetland systems could result in an adverse impact through increased erosion, loss of bank stability, downcutting of stream channels on steeper gradients, and increased sedimentation and deposition, leading to widening of the stream channel and braiding on lower gradients. Impacts from the discharge of produced water are most often adverse to riparian-wetland areas due to increased sedimentation, increased salinity, dissolved compounds, and water temperature that could adversely impact riparian-wetland systems, as discussed in more detail in the *Water* section.

Mineral materials disposals have averaged approximately 183 acres of surface disturbance per year over the past 20 years. It is not anticipated that this development would change over the next 20 years, and could be reduced because it includes years of AML work that required extensive aggregate for reclamation. While this amount of use is assumed to be constant for the over the planning period under all alternatives, the 500-foot setback protection for riparian-wetlands is applied to mineral materials disposals.

Alternative A opens 2,240,104 acres to non-oil and gas mineral leasing. The most likely development would be of phosphate resources, but these have surface restrictions on development (see the discussions for the Lander Slope and Red Canyon ACECs in the *Areas of Critical Environmental Concern* section). Solid minerals development is a surface-disturbing activity that results in long-term adverse impacts to riparian-wetlands, because all vegetation and overburden is stripped to access the minerals.

Of the alternatives, Alternative A allows motorized vehicle use on existing and designated roads and trails across the second largest area. There would be more surface disturbance associated with trail creation under Alternative A than under Alternative B, but less than under Alternative C. Motorized vehicle use and the associated increased access it provides to recreationists could adversely impact riparian-wetland resources by introducing INNS near streams or wetlands and increasing erosion and sediment loading in streams. Recreational activities such as camping often occur near riparian-wetland areas and could result in adverse impacts through soil compaction and trash accumulation in or near these areas. More developed recreation areas would increase this potential, although most impacts would be expected to be mitigated by managing recreational use to maintain or improve riparian-wetland habitat conditions along intensively used streams and reservoirs. Recreation management areas such as SRMAs and ERMAs that implement more intensive management of recreation activities in these areas would beneficially impact riparian-wetlands by restricting surface disturbance in these areas. Alternative A designates three SRMAs and 11 distinct ERMAs. These designations would result in a beneficial impact to riparian-wetland resources by focusing recreation management and could adversely impact riparian-wetland resources if recreation management concentrates usage in riparian-wetlands.

Most of the planning area is open to livestock grazing under Alternative A. Concentrated livestock grazing and over use of forage resources would increase runoff in a watershed due to soil compaction and loss of vegetative cover, with the amount of bare ground being the primary factor. As the weather dries and air temperatures increase, upland vegetation begins to dry and go dormant, but riparian-wetland areas remain lush and green. These lush green areas attract livestock to loiter and congregate. Alternative A prohibits the placement of salt and mineral supplements within ¼ mile of water, wetlands, and riparian areas, drawing livestock away from riparian-wetland areas and decreasing the direct impacts from livestock congregation in riparian-wetland areas compared to Alternative C. Livestock range improvement projects and supplements would distribute livestock over a large area, but would also create concentrated use in local areas. Over the long term, these improvements potentially improve the stability and resiliency of riparian-wetland resources.

4.4.4.3.2.4. Special Designations

Special designations beneficially impact riparian-wetlands when they place additional restrictions on activities that degrade watershed health (e.g., surface-disturbing activities and motorized vehicle use). These restrictions would result in indirect beneficial impacts to riparian-wetland areas because the areas would not be subject to large-scale surface-disturbing activities. Overall, special designations under Alternative A would result in beneficial impacts to approximately 4,340 acres of riparian-wetland resources and 17,629 acres of protections in and adjacent to riparian-wetland resources.

4.4.4.3.3. Alternative B

4.4.4.3.3.1. Program Management

Program management under Alternative B would result in more beneficial impacts to riparian-wetland resources than Alternative A. Alternative B prohibits surface-disturbing activities within 1,320 feet of surface water, riparian-wetland areas, playas, and mapped 100-year floodplains; however, this would not apply in areas with high and moderate potential for oil and gas development. The additional buffer associated with Alternative B would be expected to minimize the introduction of INNS into riparian-wetland areas. In addition, the larger buffer area would provide more herbaceous coverage for filtering sediments and dissipating water energy before water enters riparian-wetland areas, resulting in a net beneficial impact. Alternative B promotes the use of natural management strategies such as timing restrictions, road closures, and livestock management to maintain and meet PFC in riparian-wetland areas. These strategies would result in long-term beneficial impacts to riparian-wetland areas, but would not achieve riparian-wetland improvements as quickly as using fencing, as identified under Alternative A. Alternative B requires a reduction in AUMs to achieve use objectives based on monitoring, which would have a beneficial impact on riparian-wetland resources that currently do not meet Wyoming Standards for Healthy Rangelands. Watershed improvement projects under Alternative B would be anticipated to disturb the fewest acres. While these projects could result in short-term adverse impacts in terms of surface disturbance, they would result in long-term beneficial impacts to these areas.

4.4.4.3.3.2. Resources

The Little Red Creek Complex in Dubois is managed as non-WSA land with wilderness characteristics under Alternative B and would be managed to preserve its wilderness characteristics. This management prohibits surface disturbance or other activities that would adversely impact the area's wilderness characteristics, which would also have a beneficial impact on riparian-wetland areas. Local beneficial impacts in the Little Red Creek Complex would be major, but planning area-wide the beneficial impacts from this management would be minor.

Alternative B's management of forests and woodlands and forest products would be similar to those under Alternative A. However, prohibiting clear-cut of timber harvest under Alternative B should minimize overland flow and sedimentation into riparian-wetland areas, as described for Alternative A. There would be an increased risk of landscape-level fire over Alternative A in the short term, which would result in adverse impacts to riparian-wetlands. On a timeframe beyond the scale of this RMP, this would be expected to be a beneficial impact. Lack of market demand suggests that sales of forest products would result in only a minor beneficial impact to riparian-wetlands.

Management actions designed to protect wildlife and special status species habitat apply greater restrictions on surface-disturbing activity under Alternative B than under the other alternatives, and therefore would result in more beneficial impacts to riparian-wetland resources. The expansion of the greater sage-grouse buffer to 0.6 miles under Alternative B would result in moderate to major beneficial impacts to riparian-wetland areas because there would be no degradation of riparian-wetland resources from surface disturbance. Management actions designed to improve fisheries would also result in more beneficial impacts under Alternative B through the removal and minimization of barriers to fish and more in-stream flow requirements when considering projects. These restoration activities would result in beneficial impacts to riparian-wetland resources.

4.4.4.3.3.3. Resource Uses

Alternative B authorizes the fewest number of oil and gas wells. Under Alternative B, there would be a total of 17,780 acres of short-term disturbance from oil and gas development activities and 9,184 acres of long-term disturbance. Of this projected disturbance, 10,720 acres of initial disturbance and approximately 5,478 acres of long-term disturbance would be from federal wells. The remaining acres of disturbance would be associated with wells on state and private lands.

Compared to alternatives A and C, Alternative B prohibits surface-disturbing activities associated with mineral development within 1,320 feet of surface water, riparian-wetlands, playas, and 100-year floodplains, which would mitigate most direct and indirect impacts associated with mineral development. However, well pad construction, pipeline development, road construction, and gravel pit development and use would still contribute some sediment to local streams. The projected amount of surface disturbance associated with mineral development under Alternative B would be the lowest of all alternatives. Most of the impacts would be temporary during the life of the operation. Upon completion of operations and ultimate recovery of the mineral resource, all the existing disturbance would be reclaimed; however, in the short term, mineral extraction activities would increase the potential for riparian-wetland health degradation. Activities such as well pad and road construction would increase runoff and sediment loading in streams. Alternative B prohibits the surface discharge of produced water on BLM-administered surface, negating the impacts (both beneficial and adverse) described under Alternative A.

The closure of greater sage-grouse Core Area including the Beaver Rim area to oil and gas leasing would beneficially impact riparian-wetland resources in those areas by limiting oil and gas surface disturbance. This would be more beneficial than Alternative A which has a far smaller NSO protective area around leks.

The smaller amount of surface disturbance and larger riparian-wetland buffer proposed under Alternative B compared to the other alternatives would result in the least impact associated with INNS in riparian-wetlands due to surface-disturbing activities outside areas with high to moderate potential for oil and gas. Alternative B allows the Authorized Officer to require livestock flushing for 72 hours before allowing livestock to move onto or within BLM-administered land if it is suspected that livestock are carrying ingested INNS seeds. Discretionary livestock flushing would limit the risk of spreading INNS to riparian-wetland areas from ingested seeds.

Alternative B would involve the least short- and long-term surface disturbance associated with road development for oil and gas and other mineral development in the planning area. Fewer roads in the planning area would decrease opportunities for direct water flow into riparian-wetland areas, thus reducing the potential for the riparian-wetland channel to become incised and reducing the potential for INNS introduction.

Alternative B opens fewer acres to non-oil and gas mineral leasing than Alternative A. Alternative B opens 464,859 acres to leasable minerals. Solid minerals leasing involves extensive surface disturbance, so closing areas to leasing would result in beneficial impacts to riparian-wetlands to the extent that solid mineral potential exists an area.

Alternative B allows motorized vehicle use on existing and designated roads and trails in the smallest area and would result in the fewest acres of surface disturbance associated with new road and trail creation of any alternative. Limiting motorized vehicle use to a greater percentage of designated roads and trails and a lower percentage of existing roads and trails would limit public access and reduce the associated potential impacts to riparian-wetland areas described under Alternative A. Alternative B closes the largest area to motorized vehicle use compared to other alternatives. Cross-country motorized travel to retrieve big game carcasses and perform other necessary tasks such as repairing range improvement projects is prohibited in areas with limited travel designations, and would limit erosion and sediment loading from trail proliferation near riparian-wetland areas. Alternative B emphasizes developing camping or recreation sites, reducing the potential for adverse impacts associated with concentrated recreational activities. Recreation management areas such as SRMAs and ERMAs that implement more intensive management of recreation activities in these areas would result in beneficial impacts to riparian-wetlands by restricting surface disturbance and placing emphasis on ensuring recreation activities do not conflict with rangeland health objectives in these areas. Alternative B designates seven SRMAs and 12 distinct ERMAs.

Livestock grazing management is more restrictive under Alternative B compared to the other alternatives. A ½-mile buffer prohibiting the placement of salt and mineral supplements near water, wetlands, and riparian areas would provide more protection for these resources from livestock and native ungulate grazing. Alternative B would result in many fewer range improvement projects than other alternatives — perhaps none other than for the benefit of wildlife. While restricting infrastructure would limit disturbance associated with these activities in the short term, riparian-wetland areas would not experience the long-term beneficial impacts of riparian-wetland exclosures. Limiting range improvement project development would necessitate a reduction in stocking rates; however, livestock concentration would continue to impact riparian-wetland resources. Under Alternative B, use levels would be limited to light (21 to 40 percent) in areas livestock prefer, which would prevent adverse impacts from improper livestock grazing management in riparian-wetland areas.

4.4.4.3.3.4. Special Designations

Compared to other alternatives, Alternative B includes the most acres managed as special designations and places more restrictions on surface-disturbing activities in special designation areas. Restrictions such as NSO, mineral withdrawals, and prohibitions on surface-disturbing activities would limit adverse impacts on approximately 21,782 acres of riparian-wetland resources in these areas. Alternative B manages all NWSRS-eligible waterway segments as suitable for inclusion in the NWSRS, and would result in the most beneficial impacts to riparian-wetland areas. The demand for surface disturbance in these areas is not known.

4.4.4.3.4. Alternative C

4.4.4.3.4.1. Program Management

Alternative C manages riparian-wetland areas to meet PFC using all management tools available, such as range improvement projects, travel management, and new road construction. Alternative C allows the greatest level of surface disturbance, including surface-disturbing activities in floodplains and riparian-wetland areas on a case-by-case basis. By having the fewest prohibitions on surface-disturbing activities, Alternative C would result in the fewest beneficial impacts to riparian-wetlands compared to other alternatives. Like Alternative A, Alternative C would not require an MLP in the Beaver Rim area.

4.4.4.3.4.2. Resources

Alternative C does not manage any areas as non-WSA lands with wilderness characteristics and, consequently, the beneficial impacts from non-WSA lands with wilderness characteristics management would not be realized, the same as Alternative A.

Alternative C manages grasslands and shrublands to maximize forage production which favors a shift in herbaceous community to more of a grass-dominated plant community. This would have no different impacts to riparian-wetland resources than Alternative B, so long as grazing management did not allow overuse of the riparian-wetland areas by livestock preferring the grasses.

Alternative C management of forests and woodlands and forest products would result in more adverse impacts to riparian-wetland areas than Alternative B, and impacts would be similar to those under Alternative A. Under Alternative C, management actions designed to expedite and prioritize replanting would result in beneficial impacts on riparian-wetland areas by minimizing the impacts of long-term overland flow and sedimentation.

Alternative C would result in more adverse impacts associated with INNS than the other alternatives because it includes fewer restrictions on surface-disturbing activities near and in riparian-wetland areas. An increase in INNS would alter the vegetative communities, introducing species that use more water and lack the high level of soil-binding properties of native riparian-wetland species. Alternative C does not require livestock flushing, which would increase the chance of spreading ingested INNS seed in riparian-wetland areas.

Like Alternative A, Alternative C applies fewer management restrictions on surface-disturbing and surface-disruptive activities designed to protect wildlife and special status species. The absence of or decrease in these restrictions would result in fewer beneficial impacts to riparian-wetland resources compared to Alternative B. To the extent that the 0.6-mile buffer includes many more riparian-wetland areas, adverse impacts under Alternative C would be much more substantial when compared to Alternative B. Management actions designed to improve fisheries would be similar to Alternative A and would therefore result in similar beneficial impacts.

4.4.4.3.4.3. Resource Uses

Alternative C makes the most acres available for mineral development. Adverse impacts to riparian-wetlands from mineral development would be greater under Alternative C than under Alternative B, and would be similar to impacts under Alternative A. During the planning period, Alternative C would result in the short-term disturbance of approximately 22,543 acres and long-term disturbance of 11,743 acres. Of these totals, 15,473 acres of short-term disturbance and 8,032 acres of long-term disturbance would from federal wells; the remainder would be from wells on state and private lands.

However, due to buffers around riparian-wetland areas, almost all of this disturbance would occur in the uplands (the exceptions being roads and pipelines); therefore, direct adverse impacts to riparian-wetland resources would not result. The projected amount of surface disturbance associated with mineral development under Alternative C is the highest of the alternatives. Activities such as well pad and road construction would increase runoff and sediment loading in streams. Alternative C allows disposal of produced water through surface-water discharge. Impacts to riparian-wetland resources from surface-water discharge would be similar to those under Alternative A. The impacts to the riparian-wetland resources under Alternative C would be the same as under Alternative A because both apply only standard riparian-wetland stipulations.

Management of salable minerals under Alternative C would likely disturb the same number of acres as the other alternatives. However, impacts would likely be more adverse to riparian-wetlands than under Alternative B, because Alternative B includes a larger riparian-wetland setback and protects a larger portion of the transition area between riparian-wetland areas and uplands. This difference would probably be minor to moderate because mineral materials disposals avoid riparian-wetland areas under all alternatives.

Most of the planning area is open to livestock grazing under Alternative C. Livestock management strategies will be developed to meet the Wyoming Standards for Healthy Rangelands and PFC. Alternative C uses range improvement project infrastructure to implement livestock grazing management designed to protect riparian-wetland areas. These strategies must incorporate many different facets of livestock management to be successful. Systems that prove to be ineffective will be reevaluated and revised as necessary to achieve rangeland health objectives and riparian-wetlands PFC. In contrast to the other alternatives, Alternative C uses the placement of salt and mineral supplements to maximize use of the forage resource. This management strategy could result in more livestock near riparian-wetland areas, which would result in the greatest potential adverse impact to riparian-wetland areas. Alternative C manages for moderate use (41 to 60 percent) in areas livestock prefer, resulting in more use of riparian-wetland vegetation. Concentrated livestock grazing would adversely impact bank stability, and increase runoff in a watershed due to soil compaction and loss of vegetative cover. In addition, increased livestock grazing in these areas would result in a greater potential to introduce INNS. Under Alternative C, livestock grazing use levels in preferred areas would result in greater forage removal than under Alternative B. Alternative C would result in the most range improvement projects. In the short term, these projects would result in increased surface disturbance. However, in the long term, these projects would result in the most beneficial impacts to riparian-wetland resources compared to the other alternatives by drawing livestock away from sensitive areas.

Motorized vehicle use under Alternative C would result in the most impacts to riparian-wetland areas of all the alternatives. Impacts to riparian-wetlands associated with motorized vehicle uses would be similar to Alternative A, only to a greater extent. Alternative C designates most BLM-administered land in the planning area as limited to existing roads and trails and closes the fewest acres to motorized vehicle use compared to the other alternatives, which would result in adverse impacts to riparian-wetland resources in more areas. Alternative C minimizes restrictions on OHV use more than other alternatives, which would result in an increase in associated adverse impacts to riparian-wetland areas. Alternative C also allows the use of cross-country motorized travel for casual-use activities, such as well staking, that could damage vegetation and cause erosion in some riparian-wetland areas. If demand warrants, the BLM would develop or upgrade recreation sites and associated amenities, which would result in impacts similar to Alternative A. Alternative C identifies one SRMA and 13 distinct ERMAs. Restrictions on surface-disturbing activities in SRMAs and ERMAs would help reduce potential impacts (such as erosion and sediment loading in nearby streams) to riparian-wetland areas.

4.4.4.3.4.4. Special Designations

Alternative C places the fewest restrictions on surface-disturbing activity in special designations and designates the fewest of these areas. Alternative C does not designate ACECs, including the NSO stipulations so that the impacts to riparian-wetland areas would be more adverse than Alternative A. In the Beaver Rim area and the proposed expanded Green Mountain ACEC, Alternative C's management is standard stipulations so that the adverse impacts to riparian-wetland resources would be the same and more adverse than Alternative B. Alternative C does not manage any NWSRS-eligible waterway segments as suitable for inclusion in the NWSRS. Special designations under Alternative C include approximately 1,574 acres of riparian-wetland resources. Therefore, special designations under Alternative C would result in the fewest beneficial impacts to riparian-wetland areas.

4.4.4.3.5. Alternative D

4.4.4.3.5.1. Program Management

Program management under Alternative D would result in more beneficial impacts to riparian-wetland resources than those under Alternative A or Alternative C, but fewer than those under Alternative B. Alternative D prohibits surface-disturbing activities within 500 feet of riparian-wetland areas except in DDAs. Alternative D includes fewer restrictions on mineral development in DDAs, but places more restrictions on development throughout the remainder of the planning area. Beneficial impacts to riparian-wetland resources would be a product of restrictions on surface-disturbing activities from mineral development, travel management, recreational use, and modifications to livestock grazing strategies.

Alternative D includes smaller buffers around riparian-wetland areas than Alternative B, and therefore would provide less herbaceous cover for water dissipation and sediment capture than Alternative B. The adequacy of riparian-wetland buffers varies greatly based on a number of factors including slope, soil type, adjacent land use, precipitation, and stream size. Given the large number of variables, 500 feet would likely be adequate to account for these variables while providing the necessary attributes for water dissipation, sediment capture, and habitat needs of amphibians and other wildlife species to beneficially impact riparian-wetland resources. It is currently undetermined what level of beneficial impact there would be from the additional buffer under Alternative B.

Alternative D utilizes management strategies such as timing restrictions, road closures, and livestock management to maintain and meet PFC in riparian-wetland areas rather than new infrastructure such as fences and water improvement projects unless the proposed infrastructure is part of a Comprehensive Grazing Strategy. Where natural strategies are employed, Alternative D would result in broader beneficial impacts to riparian-wetland areas than relying on actions such as fencing identified in for alternatives A and C. However, Alternative D uses fencing in many more situations than Alternative B. While fencing would not be practical on a large scale, and could result in conflicts with other resources such as wildlife, when combined with a broader management strategy that includes restricting use levels in riparian-wetland areas, and where site-specific conditions are favorable, fences could be effective in improving riparian-wetland systems.

Alternative D applies an MLP to the Beaver Rim area and applies NSO management to the proposed expansion of the Green Mountain ACEC.

4.4.4.3.5.2. Resources

Alternative D manages the Little Red Creek Complex as non-WSA land containing wilderness characteristics to maintain its wilderness characteristics but on a smaller area than under Alternative B. This management would beneficially impact riparian-wetland values in the area by limiting surface disturbance and development. This would be more beneficial than Alternative A or Alternative C, neither of which manage the area with any special protections for wilderness characteristics.

Alternative D manages grasslands and shrublands similar to Alternative A with the same neutral impacts. The difference in goals for vegetation communities inside DDAs are different than outside. However, both will meet Wyoming Standards for Healthy Rangelands, and both would be capable of stabilizing soils, dissipating water-flow energy, and increasing water infiltration rates and water-holding capacity, thereby minimizing sediment movement offsite into riparian-wetland areas. Conversely, degraded grasslands and shrublands that do not meet Standards for Healthy Rangelands would allow for more overland flow during storm events and ultimately more sediment movement into riparian-wetland areas. The desired herbaceous communities would vary from those under alternatives B and C; however, impacts to riparian-wetland resources would not be expected to vary as a result.

Alternative D management of forests and woodlands and forest products allows for clear-cuts, determining the size and location based on resource values and silviculture objectives. There is no standardized buffer for riparian-wetland areas, and the size of clear-cuts is not regulated through this process. Alternative D allows for site-specific analyses to identify the appropriate buffer width and size of clear-cut to minimize impacts to riparian-wetland resources. Identifying riparian-wetland buffers adequate to filter and capture sediment based on regional topography and clear-cut size would have a greater beneficial impact on riparian-wetland systems than the standardized buffer widths and slope restrictions under alternatives A and C. However, given the lack of local demand for forest products and the limited resources in the planning area, it is anticipated that impacts to riparian-wetland areas due to the harvest of forest products would be minor under all alternatives.

Alternative D applies more restrictions on surface-disturbing activities than alternatives A and C, but not as many as Alternative B. Accordingly, impacts to riparian-wetland resources would be less than those under alternatives A and C, but more than those under Alternative B. Restrictions on surface disturbance due to special status species limit the amount of bare ground allowed, particularly in the greater sage-grouse Core Area, and therefore would reduce overland flow and sedimentation into riparian-wetland areas. Outside the Core Area, the limitation on surface disturbance around leks is the same under Alternative D as under alternatives A and C, with moderate to major adverse impacts to riparian-wetland areas. The closure of the Dubois area under Alternative D to surface-disturbing activities such as oil and gas development, phosphate leasing, mineral materials disposals, and major ROWs would result in a net beneficial impact to riparian-wetland resources by reducing sedimentation from upland runoff. However, the Dubois area has not historically been an area of intensive mineral development, so the beneficial impact to riparian-wetland resources could be limited.

4.4.4.3.5.3. Resource Uses

Alternative D makes available more acres for mineral development and authorizes more wells than Alternative B, but not as many acres as alternatives A and C. Under Alternative D, there would be a total of approximately 21,533 acres of initial surface disturbance and 11,201 acres of long-term disturbance. Approximately 14,473 acres of initial disturbance and approximately 7,495 acres of long-term disturbance would be associated with federal wells. The remaining acres would be associated with wells on state and private lands. Similarly, Alternative D withdraws fewer acres from locatable mineral entry than Alternative B, but not as many as Alternative A and substantially fewer than Alternative C. Alternative D proposes to withdraw approximately 42,855 acres from locatable mineral entry. Therefore, Alternative D will result in more adverse impacts to riparian-wetland areas due to mineral development than Alternative B. However, Alternative D would result in more beneficial impacts than Alternative A, and substantially more beneficial impacts than Alternative C, based on greater number of acres withdrawn from locatable mineral entry, closed to mineral leasing, or leased with more restrictions. Generally, Alternative D would protect approximately 125,403 fewer acres of riparian-wetland resources than Alternative

B. Conversely, Alternative D would protect more acres than alternatives A and C because more riparian-wetland areas would be protected by other management.

Alternative D would result in more initial and long-term surface disturbance associated with linear features such as roads and pipelines than Alternative B, but less than alternatives A and C. Fewer linear disturbances, primarily as a product of restrictions on mineral development, would reduce opportunities for direct water flow into riparian-wetland areas, thus reducing the potential for stream channel degradation and reducing the potential for INNS introduction.

Alternative D allows motorized vehicle use on existing roads and designated roads and trails in a larger area than Alternative B, but a smaller area than alternatives A and C. The result would be less surface disturbance and fewer new roads and trails created than under alternatives A and C. Alternative D would impact approximately 125,403 more acres of riparian-wetland resources than Alternative B. Conversely, Alternative D would impact approximately 20,000 fewer acres than alternatives A and C due to motorized vehicle closures. Motorized vehicle use would increase adverse impacts to riparian-wetland areas, as described under Alternative A, and would increase the likelihood of user-created roads.

As identified for the other alternatives, Alternative D opens most of the planning area to livestock grazing. Livestock grazing management would be less restrictive under Alternative D than under Alternative B because Alternative D allows moderate use levels when accompanied with a Comprehensive Grazing Strategy, and would use more infrastructure to improve rangeland health and meet rangeland health objectives. However, in cases where livestock use is continuous or takes place annually during the critical growing season for uplands or during the riparian-wetland hot seasons, light use might be necessary. Use levels would be based on the results of monitoring data. Given that a large number of grazing allotments in the planning area have continuous use during the critical growing season or during the riparian-wetland hot season, it is anticipated that light use would be necessary to achieve Wyoming Standards for Healthy Rangelands and meet PFC for riparian-wetland systems. In addition, Alternative D requires that forage requirements for big-game herd objectives be considered when determining stocking rates for livestock and wild horses. Because riparian-wetland systems are critical to all wildlife species, it is anticipated that Alternative D would require lower stocking rates for livestock than alternatives A and C, but would not reduce stocking rates as much as under Alternative B. Moderate livestock grazing use would result in beneficial impacts to riparian-wetland systems by reducing over use, hummocking, and stream bank shearing. With healthier herbaceous communities, riparian-wetland areas would be capable of filtering and trapping more sediments and contaminants, and would enhance water infiltration. Alternative D restricts the placement of mineral supplements similar to Alternative B, which would result in similar beneficial impacts. While these beneficial impacts would be more pronounced under Alternative D than under Alternative A, and far exceed those under Alternative C, they would not be as widespread or effective as under Alternative B.

Recreation management areas such as SRMAs and ERMAs that implement more intensive management of recreation activities in those areas would beneficially impact riparian-wetland areas by restricting surface disturbance and placing emphasis on ensuring recreation activities do not conflict with rangeland health objectives. In this regard, Alternative D would result in beneficial impacts to riparian-wetland areas similar to Alternative B, fewer impacts than Alternative A, and more impacts than Alternative C, which emphasizes motorized recreation.

4.4.4.3.5.4. Special Designations

Alternative D manages 11,185 acres of riparian-wetland resources within special designations. Furthermore, Alternative D limits or closes to surface disturbance 41,543 acres within 500 feet of riparian-wetlands as part of special designation management. Generally speaking, the more limits on surface disturbance an alternative contains, the more beneficial impacts to riparian-wetland resources result.

4.4.5. Fish and Wildlife Resources – Fish

For purposes of analysis, the fish species addressed in this section include species endemic to the planning area not addressed in the *Special Status Species – Fish* section. Implementation of certain management actions could impact fish, depending on alternative. This section describes the direct, indirect, short-term, and long-term adverse and beneficial impacts to fish under each alternative.

4.4.5.1. Summary of Impacts

Management actions and activities that result in soil erosion and increased sediment flow into fish-bearing waterbodies typically result in adverse impacts to fish populations and fish habitat. Actions that maintain or increase the amount of vegetative cover along stream banks that helps regulate water temperatures beneficially impact fish habitat and macroinvertebrate production. Direct impacts to fish can occur from vehicles directly entering stream channels on roads and trails. Alternative B provides the greatest protection from surface-disturbing activities and would result in the greatest beneficial impacts to fish resources. Alternative C provides the least amount of protection and would result in the greatest potential for adverse impacts to fish resources. Alternative D is similar in many aspects to Alternative A, but Alternative D increases protection in areas important for other resources, particularly in special designation areas.

4.4.5.2. Methods and Assumptions

Management actions or resource uses that contribute to a decrease in abundance or distribution of native fish species adversely impact fish resources. Conversely, management actions or measures that protect fish species from disturbance improves habitat, or leads to increased populations or viability beneficially impacts fish resources.

For purposes of this analysis, direct impacts are those that cause damage to habitat or habitat quality or results in the loss or decline of fish populations. Direct impacts can result from recreational use, toxicity from chemical contamination, or sedimentation. Indirect impacts include the loss of suitable habitat for future occupation or reproduction. Conversely, management actions that help protect suitable habitat result in indirect beneficial impacts to fish resources.

This analysis considers short-term impacts to fish species as those that contribute to a decline in abundance or distribution within 5 years of an activity or management action, and long-term impacts as those that do not manifest themselves until more than 5 years after an activity or management action.

Methods and assumptions used in this impact analysis include the following:

- Activities that cause substantial disturbance to soils and vegetation can adversely impact water quality and quantity, reducing habitat quality for fish that require clear water, moderated streamflows, and clean substrates.
- Surface disturbance accelerates runoff and sediment delivery to stream channels, which can alter streamflows and adversely impact most fish species. This analysis focuses on the degree of surface disturbance anticipated to occur under each alternative.
- The potential for sedimentation of streams and rivers can be minimized through the use of BMPs.
- The Wyoming State Engineer's Office regulates activities that affect water quantity.
- The Wyoming DEQ regulates activities that affect water quality.
- The Wyoming Game and Fish Department (WGFD) will continue to manage fish populations and the BLM will continue to manage fish habitats in coordination with the WGFD.
- Disturbance during sensitive periods can adversely impact fish populations.
- Consideration of aquatic habitat conditions when conducting BLM assessments, such as PFC and rangeland health, will help to identify areas for stream habitat management and watershed management efforts.
- The health of fisheries in the planning area is directly related to the overall health and functional capabilities of riparian-wetland resources.
- Activities that affect the ecological condition of the watershed and its vegetative cover will directly or indirectly affect the aquatic environment. The degree of impact attributed to any one disturbance or series of disturbances is influenced by location within the watershed, time and degree of disturbance, existing vegetation, and hydrologic condition.
- As riparian-wetland systems adjust in response to the removal of vegetation or changes in hydrologic conditions, the availability of habitats required to fulfill the life history requirements of fish populations is likely to be affected.

4.4.5.3. Detailed Analysis of Alternatives

Management actions and resource uses that could impact fish species and their habitats include all surface-disturbing activities, grazing (livestock, wild horses, native ungulates), chemical or hydrocarbon contamination of water resources, OHV use, fire management, and activities that deplete water quantity and the addition, timing, and temperature of clean water (CBNG produced water).

Conversely, resource uses prescribed under the alternatives that would adversely impact fish could, in turn, be limited by management actions that protect fish species.

4.4.5.3.1. Impacts Common to All Alternatives

Although the types of impacts to fish species under the alternatives are similar, the intensity of these impacts would vary by alternative. Potential impacts common to all alternatives are described below.

Impacts that result in a decline in abundance or distribution of fish species can be generally divided into two broad categories: (1) impacts associated with a change in water quality and (2) impacts associated with a change in water quantity. For this analysis, water quality is defined in terms of sediment loading, water temperature, and water chemistry. Water quantity is assumed to be average flows under natural conditions.

An integrated management approach is used to achieve fish habitat objectives. In cooperation with partners, strategies will be developed and implemented to prevent the introduction and spread of aquatic invasive species, which can severely impact fish habitat by reducing food sources for fish and outcompeting native fish for limited resources. Movement of water from one drainage to another is avoided to prevent the transfer of aquatic invasive species and disease.

Road crossings of streams are designed and located to minimize impacts to fish movement. Where feasible, existing road crossings identified as restricting fish passage will be modified. During wildfire suppression activities, fire retardant would not be aerially applied within 300 feet of waterbodies to prevent chemicals from reaching waters. Due to the difficulty in judging distance from the air and the possibility of chemical drift, some fire retardant could get into the water. The potential for adverse impacts would depend on the amounts and types of chemicals to which fish are exposed.

Wild horses can indirectly impact fish habitats by contributing to soil erosion through trampling of stream banks and adjacent trails. However, wild horse numbers do not change among the alternatives, thus there would be no differences in anticipated impacts.

Impacts to fish species and habitat from air quality, geologic, and cave and karst resource management would not vary by alternative. No lands identified for disposal contain fish habitat; therefore impacts would not be expected under any alternatives.

4.4.5.3.2. Alternative A

4.4.5.3.2.1. Program Management

Under Alternative A, the Lander Field Office can, on a case-by-case basis, apply seasonal restrictions on surface-disturbing activities that would adversely impact fish spawning and manage human-caused barriers to fish passage. Actions that would result in the removal or depletion of water from fish-bearing streams can be authorized. Current management prohibits surface-disturbing activities within 500 feet of a riparian-wetland area, and BMPs that limit offsite soil erosion or runoff are typically applied to all surface-disturbing activities.

4.4.5.3.2.2. Resources

Soil disturbance and erosion can adversely impact water quality. Fugitive dust from wind erosion of surfaces exposed by road building, oil and gas development, fire and fuels management, mining, and concentrated livestock grazing can enter surface water directly or be washed into it during precipitation events. Once in the water, this dust adds to the sediment load in the stream and can impact fish populations, both directly and indirectly. Increased sediment can directly suffocate fish eggs or impair the overall production of macroinvertebrates upon which mature fish depend. Other pollutants suspended in the air that alter the chemistry of precipitation (i.e., acid rain) can result in similar impacts to fish habitat. Soil erosion from surface-disturbing activities leads to sediment loading as described above and can also change water chemistry by leaching minerals into the water that have been exposed by mining or other surface disturbances. Under Alternative A, cumulative short-term surface disturbance in the planning area is expected to be approximately 52,591 acres, and cumulative long-term surface disturbance would be 12,439 acres during the planning period.

Alternative A does not specifically manage lands with wilderness characteristics. Small drainages are present on these lands, but they are not known to support fish.

Alternative A forest management actions could impact fish species through the generation of additional sediment, as described above, and through surface disturbance associated with the construction of access roads and harvesting techniques. A variety of silviculture practices are used to meet forest health objectives and the demand for forest products. Alternative A prohibits clear-cuts on slopes greater than 45 percent or larger than 25 acres, reducing the potential for large amounts of sediment being generated. Actions on steep slopes that result in large areas devoid of vegetation (i.e., clear-cuts) would have the greatest potential for accelerated soil erosion that could add sediment to fish-bearing waterbodies.

Wildfire, and to some degree, prescribed burning, can adversely and beneficially impact fish, depending on fire intensity. In situations where the fire is intense, temperatures can become high enough to destroy both plant communities and the soil fertility upon which they depend. This could produce a large area of little or no vegetative cover, resulting in increased sediment entering aquatic systems. However, low-intensity fuels reduction burning could beneficially impact fish by preventing more intense, landscape-level wildfires while retaining enough plant litter to slow runoff and recycle nutrients to encourage vigorous growth of groundcover. Fire that reduces plants that require a lot of water, such as conifers and sagebrush, could increase the amount of water from rain and snow events reaching streams, resulting in beneficial impacts to fish populations. Approximately 800 acres of treatments to reduce fuels and manage vegetation are expected to occur each year under Alternative A.

Management actions that alter vegetative communities, whether they be forest/woodland, grassland/shrubland, or riparian-wetland habitats, can indirectly impact fish species in various ways. Actions that disturb vegetation can alter plant composition and structure within that habitat. Loss or alteration of vegetative cover through surface disturbance, wildfire, or vegetative treatment can change the hydrologic regime of the watershed in which it occurs. With less vegetation to retain water from precipitation and snowmelt, more surface erosion occurs and streams tend toward brief high-water events that further erode their banks and add to sedimentation of the waterbody. As water is quickly released into streams, less is held in reserve to maintain streamflow during drier periods. Therefore, conversion of habitat results in adverse impacts both to quality and quantity of water for fish. Loss of shade cover in riparian-wetland habitats also results in increases in water temperature that can make the adjacent stream unusable for species such as trout that require colder water. Management actions that maintain healthy rangelands in their natural condition generally would beneficially impact fish and their habitats.

The introduction or proliferation of INNS might result in little direct impact to fish species. However, because INNS are typically able to outcompete native plants and establish themselves in habitat that might otherwise be suitable for colonization by native plant species, they can prevent the growth of plants better able to retain soil during precipitation events. For example, cheatgrass is a shallow-rooted INNS that establishes itself quickly in disturbed areas. As a vegetative cover for holding soil and preventing erosion, it is far less desirable than a more deeply rooted native grass species. Moreover, the presence of INNS can require the use of herbicides that could alter water quality or kill fish outright if used near riparian-wetland areas.

Over-utilization of vegetation by certain wildlife species, primarily big game, could adversely impact fish by contributing to the loss of streamside vegetation necessary to shade water and maintain water temperatures. Most game fish require colder water temperatures, and heavy browsing by moose, elk, and deer of willows and other woody species could lead to reduced shading and increased water temperatures. Over-utilization is often a product of competition between big game species and domestic livestock or wild horses in localized areas.

Alternative A protections for cultural, paleontological, and visual resources from disturbance could also have a beneficial impact on fish and fish habitats by preventing surface disturbance that could contribute to soil erosion and sedimentation.

4.4.5.3.2.3. Resource Uses

Exploration for, or development of, locatable and leasable minerals and/or mineral material disposals could adversely impact fish and fish habitats by creating surface disturbance, thereby contributing to soil erosion and the accompanying sedimentation. Such development could also introduce contaminants such as hydrocarbons and other chemicals into fish habitats. In addition, oil and gas development produces water as a byproduct (called produced water) that is often disposed of on the surface and can flow into fish habitats, changing both the temperature and chemistry of the water and further contributing to erosion potential. Under Alternative A, most of the planning area is open to mineral development, and actions associated with these activities are expected to produce approximately 21,234 acres of short-term disturbance and 9,895 acres of long-term disturbance on BLM-administered lands during the planning period.

Impacts to fish and their habitats from wind-energy development and ROW/utility corridors would be similar but would vary among alternatives by the acres open to development. All these uses involve some level of surface disturbance that could contribute to soil erosion and subsequent sedimentation. Alternative A opens 2,113,512 acres to wind-energy development, although it is expected that development would only occur in areas with high potential for wind-energy and not across the entire planning area. Alternative A opens 2,188,294 acres (91 percent of the planning area) to ROWs, excludes ROWs on 205,916 acres, and avoids ROWs on 66,099 acres. Alternative A designates one ROW/utility corridor, the 79-216 national energy corridor, but does not designate a specific number of acres for this corridor. Alternative A considers oil and gas leases in the area to the east of Boysen Reservoir on a case-by-case basis which has the potential of adversely impacting fish and aquatic resources.

Alternative A allows livestock grazing on 2,324,934 acres (97 percent of the planning area) and manages forage utilization levels and the construction of range improvements such as fences and water developments on a case-by-case basis. Livestock grazing can adversely impact fish habitats, both directly and indirectly. If forage utilization levels are not established and livestock are allowed to concentrate, such as would occur around watering locations, mineral supplement sites, and along fences, soil-holding vegetation could be lost to improper livestock grazing management or excessive trampling. In turn, this could compact and erode soil, making the site prone to soil loss, either by wind or water, and contribute to additional sedimentation of fish-bearing waterbodies. Heavy grazing use in riparian-wetland areas produces direct erosion into watercourses, removes stream bank vegetation, and contributes to the desiccation of these areas and the loss of their water-holding capacity. The loss of capacity to retain water in riparian-wetlands would contribute to lower water levels in downstream fish habitats during the drier seasons, which would result in direct adverse impacts to fish and impacts to the macroinvertebrates and aquatic insects on which fish feed.

Recreation and recreation management could result in a variety of impacts, both adverse and beneficial, to fish and their habitats. Alternative A designates a total of 2,394,210 acres SRMAs or ERMAs, with limited restrictions on mineral and realty actions. Restrictions on such activities would result in indirect beneficial impacts to fish habitat by reducing the potential for surface disturbance and sedimentation.

Recreational fishing can reduce populations of certain game fish species over a prolonged period, but this would not be likely to result in the loss or modification of habitat. Other forms of recreation can adversely impact fish and fish habitats similar to impacts from industrial uses. Unauthorized establishment of trails, whether by hikers or OHV users, can also result in soil compaction, erosion, and the generation of fugitive dust with the associated problems of sedimentation.

Travel management is of particular importance to fish habitat because roads, and to a lesser degree, trails are often major sources of runoff and sediment. Roads where vehicles must enter the water to cross the stream would result in more adverse impacts than roads that have culverts and bridges installed at stream crossings. Alternative A closes 5,923 acres (0.25 percent of the planning area) to motorized travel, which would beneficially impact fish resources in those areas. In addition, Alternative A designates open roads and trails on 163,075 acres (7 percent of the planning area), which would reduce the number of roads and the potential for soil erosion and sediment entering fish-bearing waterbodies on these lands. Alternative A limits motorized travel to existing roads and trails on approximately 93 percent of the planning area, which increases the potential for additional sediment to enter fish habitats.

4.4.5.3.2.4. Special Designations

Lands designated for special management in the planning area beneficially impact fish and fish habitats because they have more restrictions on activities that can generate surface disturbance and adversely impact water quality and stream health. Alternative A designates 119,622 acres (5 percent of the planning area) into nine ACECs that also support fish resources, even though fish habitat is not the focus for the ACEC designation. For example, management prescriptions to protect wildlife resources in the Lander Slope and Green Mountain ACECs improve habitat quality for tributaries of the Popo Agie and Sweetwater rivers, respectively.

There are 55,338 acres within eight WSAs in the planning area; the Sweetwater Canyon WSA is the only one containing fish resources. There are segments along Baldwin Creek and Sweetwater River eligible for inclusion in the NWSRS. These waterways support fish populations, and the Sweetwater River is one of the largest and most productive public land fisheries in the planning area. Alternative A does not specifically manage these eligible waterways, but the alternative does manage in accordance with prescriptions for the Lander Slope ACEC and the Sweetwater Canyon WSA, respectively, within which they lie.

4.4.5.3.3. Alternative B

4.4.5.3.3.1. Program Management

Compared to alternatives A and C, Alternative B is generally more protective of resources and is more restrictive to resource uses.

Alternative B applies seasonal restrictions to surface-disturbing activities within floodplains or within 1,000 feet (whichever is greater) of fish-bearing streams to protect game and nongame fish species during spawning, egg incubation, and fry stages. Dates vary by fish species, and mineral and realty actions would be somewhat restricted from surface-disturbing actions. Seasonal restrictions would prevent the loss of eggs and young, and beneficially impact local fish populations.

Alternative B removes human-caused barriers to fish passage where feasible to facilitate genetic diversity and population stability. Barriers are placed if needed to conserve populations from hybridization or competition, and fish passages could be built if necessary. These actions would benefit local fish populations whether on or off of BLM-administered lands.

Alternative B prohibits new actions that would result in removal or depletion of water from fish-bearing streams, and removes existing projects that affect the sustainability of fish populations. The availability of water is essential to maintaining fish populations.

4.4.5.3.3.2. Resources

The nature of impacts to fish species and their habitats related to soil erosion are the same under Alternative B as Alternative A, except that the intensity of impacts would differ. Under Alternative B, cumulative short-term surface disturbance for the planning period is expected to be approximately 74,689 acres, or approximately 30 percent more acres than Alternative A. The increase in short-term disturbance primarily derives from an increase in vegetation treatments, including forest products, which can result in both adverse and beneficial impacts to fish habitats. Anticipated cumulative long-term surface disturbance is 7,502 acres, or approximately 40 percent fewer acres than Alternative A.

Alternative B closes 5,490 acres of lands with wilderness characteristics to motorized and mechanized travel. This action would beneficially impact fish and fish habitats downstream from those lands through reduced potential for increased sedimentation from surface disturbance.

Forest management under Alternative B prohibits the use of harvest techniques that create clear-cuts. Alternative B would result in greater beneficial impacts to fish and fish habitats than Alternative A, because soil erosion, vegetative cover loss, and road construction associated with clear-cuts would not occur. Soil erosion would likely occur from the use of other silviculture practices, but soil loss and potential sedimentation in nearby waterbodies would be reduced by eliminating clear-cuts.

Adverse and beneficial impacts to fish habitats from wildfire and fuels treatments under Alternative B would be the same as under Alternative A. However, 2,500 acres per year are expected to be treated under Alternative B, more than triple the projected 800 acres per year under Alternative A, increasing the potential for beneficial and adverse impacts over a larger area.

Under Alternative B, management actions that disturb vegetation communities could indirectly impact fish species as described for Alternative A. The mechanism of impact is the same under each alternative; however, differences in impact intensity would vary, primarily with the resource uses that alter these habitat types. See the vegetation subsections of the *Biological Resources* section for a more detailed discussion of vegetation management.

Alternative B INNS treatment would be the same as under Alternative A, except that Alternative B includes greater efforts to identify and prioritize areas with substantial infestations and treat those areas with a more integrated approach. This includes such techniques as livestock flushing and stricter controls on authorized activities that can spread INNS from one area to another. Under this alternative, annual brome species would be treated throughout the planning area instead of in specific areas, as would be the case under Alternative A. To the extent that these additional efforts would likely reduce impacts to fish habitats by providing better protection from sedimentation, impacts would be beneficial. However, a more aggressive approach to INNS control could also increase the potential for contamination of fish-bearing streams through herbicide application.

Wildlife over-utilization of woody species would likely occur in situations where there is increased competition between big game and livestock for forage. Under Alternative B, forage allocations for livestock and wild horses are adjusted as necessary to meet the forage requirements for big game, alleviating the need for forage competition. Such an adjustment should reduce the potential for adverse impacts to fish habitats from reduced stream bank shading that increases water temperatures.

Under Alternative B, protection for cultural, paleontological, and visual resources is expanded considerably to include entire landscapes or viewsheds around important resources. These expanded protections close lands to most surface-disturbing activities and would beneficially impact fish habitats by reducing the potential for soil erosion and attendant sedimentation into streams in those areas.

4.4.5.3.3.3. Resource Uses

Alternative B places more constraints on the exploration and development of locatable and leasable minerals and mineral material disposals for the purpose of protecting other resource values, including fish-bearing habitats. Alternative B opens substantially fewer acres in the planning area to mineral development than Alternative A, which would reduce the potential for impacts from surface disturbance and stream sedimentation associated with mineral activities. More acres of protection and fewer acres of potential surface disturbance would beneficially impact fish and their habitats. During the planning period, Alternative B is expected to produce approximately 16,549 acres of short-term disturbance on BLM-administered lands and 7,378 acres of long-term disturbance from mineral development. Alternative B closes the area to the east of Boysen Reservoir to oil and gas leasing which is more beneficial to fish and aquatic resources than Alternative A.

Alternative B opens 41,372 acres (approximately 2 percent of the planning area) to wind-energy development in the planning area compared to the 2,113,512 acres open under Alternative A. Alternative B opens less land to ROWs (159,962 acres) and manages more land as ROW exclusion areas (1,919,029 acres) or ROW avoidance areas (315,962 acres) than Alternative A. Alternative B designates utility corridors on 15,364 acres to concentrate surface disturbance, although designating corridors would not necessarily preclude ROW development in other areas. Alternative B closes more lands to wind-energy and ROW development; therefore, this alternative would decrease the potential for soil erosion and sediment generated from surface-disturbing activities to enter streams and adversely impact fish and fish habitat. Alternative B would result in greater beneficial impacts to fish and fish habitat from management of wind-energy and ROW development than Alternative A.

Although Alternative B allows for nearly the same number of acres open to livestock grazing (2,312,095 acres, or 97 percent of the planning area), it requires light utilization (21 to 40 percent) while Alternative A can allow for higher utilization on a case-by-case basis. In addition, Alternative B closes Sweetwater Canyon to livestock grazing to protect a premier trout fishery and recreational values. Alternative B also prescribes livestock grazing management primarily without the use of infrastructure or range improvements such as fences and water developments. These provisions under Alternative B tend to decrease the likelihood of the adverse impacts described for Alternative A and would result in indirect beneficial impacts to fish and their habitats by reducing the potential for sedimentation, loss of streamside vegetation, and loss of water-holding capacity.

Alternative B expands the recreation program to include numerous new recreation management areas to facilitate various types of recreation use. Alternative B decreases the acreage of the Lander ERMA by 536,770 acres to provide more specific management in SRMAs and other ERMAs. Alternative B applies management prescriptions to SRMAs and distinct ERMAs to enhance their recreation values, including restricting surface uses from mineral and realty actions in these areas which would benefit fish resources. Alternative B would result in greater beneficial impacts to fish habitats from these increased protections than Alternative A.

Alternative B increases the number of acres closed to motorized travel over Alternative A to 71,761 acres (3 percent of the planning area). Alternative B designates open roads and trails on 193,704 acres (8 percent of the planning area), which is an increase of 1 percent over Alternative A. Alternative B would result in greater beneficial impacts to fish and fish habitats than Alternative A by reducing the potential for soil loss and sedimentation from roads and trails.

4.4.5.3.3.4. Special Designations

In addition to the protections afforded to fish and their habitats by special management designations described under Alternative A, Alternative B creates several new ACECs and expands protections for many of the existing ACECs. Alternative B designates 1,492,990 acres (62 percent of the planning area) as ACECs, approximately 11 times more acres than Alternative A. Increased mineral, realty, and travel management restrictions would beneficially impact fish populations and habitats within or downstream of these special management areas by protecting them from adverse impacts associated with surface disturbance.

Alternative B closes all eight WSAs to motorized and mechanized travel, which would reduce soil erosion from roads and trails and beneficially impact fish resources in these areas. The premier trout fishery in the Sweetwater River that flows throughout the Sweetwater River WSA and the drainages of the Popo Agie River would particularly benefit from this management. Eligible segments on Baldwin Creek and Sweetwater River are recommended as suitable for inclusion in the NWSRS and managed to maintain or enhance the waterways, including fish habitat. Alternative B would result in a greater beneficial impact than Alternative A, because Alternative B subjects more acres to restrictive prescriptions that reduce the surface disturbance that can adversely impact fish and their habitats.

4.4.5.3.4. Alternative C

4.4.5.3.4.1. Program Management

Compared to alternatives A and B, Alternative C is generally less protective of resources and less restrictive to resource uses.

Under Alternative C, seasonal restrictions to protect fish during reproductive periods would be applied on a case-by-case basis, as would removing human-caused barriers to fish passage and allowing actions that remove or deplete water from fish-bearing streams. Alternative C would result in the same impacts as Alternative A, and fewer beneficial impacts to fish and fish habitat than Alternative B, which applies these management actions in all cases.

4.4.5.3.4.2. Resources

Impacts to fish and fish habitat from fugitive dust, soil erosion or compaction, and excess runoff or sedimentation of water resources would be likely to increase under Alternative C. Approximately 160,065 acres of cumulative short-term surface disturbance is expected to occur in the planning area during the planning period, an approximate 200 percent increase over Alternative A and 115 percent increase over Alternative B. Cumulative long-term surface disturbance is expected to be 60,631 acres, or more than 400 percent more acres than Alternative A and more than 700 percent more acres than Alternative B. Alternative C would result in more adverse impacts from soil erosion and additional sediment into waterbodies that support fish than alternatives A and B.

Alternative C does not apply special management to the lands with wilderness characteristics. Impacts to fish and fish habitats downstream of these lands would be the same under Alternative C as Alternative A, and less beneficial than impacts under Alternative B, which closes the area to motorized and mechanized travel.

Forest management under Alternative C allows the use of clear-cuts and does not restrict the number of acres of the cut. In addition, clear-cuts using a cable system or helicopter would be allowed on slopes in excess of 45 percent. Ground-based logging would be limited to areas with 45 percent slopes or less. Logging on steep slopes would increase the potential for soil loss that could end up in waterways. Alternative C would result in a greater risk for adverse impacts from soil loss and additional sediment entering fish-bearing waterbodies than alternatives A and B.

Adverse and beneficial impacts to fish habitats from wildfire and fuels treatments under Alternative C would be the same as Alternative A. Alternative C is expected to result in 800 treatment acres per year, the same as Alternative A and 1,700 fewer acres than Alternative B.

Similar to the other alternatives, Alternative C management actions that disturb vegetation communities could indirectly impact fish resources. Impacts from vegetation management under Alternative C would be the same as Alternative A. The differences in intensity of impacts vary primarily with resource uses that alter these habitat types. See the vegetation subsections of the *Biological Resources* section for a more detailed discussion of vegetation management.

Alternative C treatment of INNS is the same as Alternative A. This approach would be expected to produce the same level of beneficial impacts to fish and their habitats as Alternative A, but would result in fewer beneficial impacts than Alternative B, which utilizes a more aggressive approach to treatments.

Over-utilization by wildlife, as described under Alternative A, is most likely to occur in situations where there is increased competition between big game and livestock for forage. Alternative C gives priority to livestock in allocation of forage. In times when forage is in short supply (i.e., drought years), competition between big game and livestock/wild horses for the remaining forage would likely increase, increasing the risk of over-utilization of streamside vegetation. Compared to alternatives A and B, Alternative C increases the potential for adverse impacts to fish habitats from forage management.

Protections for cultural, paleontological, and visual resources are the same as or less restrictive than Alternative A, and much less restrictive than Alternative B. Protecting cultural, paleontological, and visual resources from surface-disturbing activities also protects fish habitats; because Alternative C affords fewer protections for these resources, it would result in a greater risk of adverse impacts to fish resources than alternatives A and B.

4.4.5.3.4.3. Resource Uses

Alternative C eases some of the constraints under alternatives A and B to protect other resource values, including fish and their habitats, to promote exploration and development of locatable and leasable minerals and mineral material disposals. Withdrawals from locatable mineral exploration would not be pursued and existing withdrawals, except the one for desert yellowhead critical habitat, are allowed to expire. Fewer restrictions on oil and gas leasing and fewer restrictions on minerals exploration and development could increase the likelihood of more surface disturbance and increase the likelihood of adverse impacts to fish and their habitats. Under Alternative C, substantially more acres in the planning area are open to mineral development than under Alternative B and slightly more acres are open than under Alternative A. Actions associated with these activities on BLM-administered lands are expected to produce approximately 21,302 acres of short-term disturbance and 9,932 acres of long-term disturbance during the planning period. Short-term and long-term disturbance acres would be approximately the same under Alternative C as Alternative A and more than Alternative B (32 percent and 46 percent more acres, respectively). Alternative C would result in more adverse impacts to fish and fish habitats from minerals management than alternatives A and B. Alternative C, like Alternative A, has the same potential adverse impacts to fish and aquatic resources in the area east of Boysen Reservoir from oil and gas leasing on a case-by-case basis.

Alternative C opens 2,284,235 acres (95 percent of the planning area) to wind-energy development, approximately 7 percent more acres than Alternative A and 98 percent more acres than Alternative B. Similarly, Alternative C opens more lands to ROWs (94 percent of the planning area) and manages less acres as ROW exclusion or avoidance areas (147,053 and 11,714 acres, respectively) than alternatives A and B. Alternative C designates utility corridors on 660,908 acres. Alternative C opens more lands to wind-energy and ROW development than alternatives A and B, and would result in a greater risk of surface-disturbing activities that can cause soil erosion and stream sedimentation. Alternative C would result in more adverse impacts to fish and fish habitat from wind-energy and ROW development than alternatives A and B.

Alternative C allows for livestock grazing on approximately the same number of acres as Alternative A. It also allows moderate (41 to 60 percent) utilization, while Alternative A establishes utilization levels on a case-by-case basis and Alternative B manages for light utilization (21 to 40 percent). Alternative C also prescribes a more intensive use of infrastructure or range improvements to manage livestock. The increased use of range improvement projects to manage livestock can increase the amount of soil disturbance and bare ground from fence and water development construction and associated trailing and trampling. The provisions in Alternative C would tend to increase the likelihood of adverse impacts (e.g., trampling, over-utilization, soil disturbance, sedimentation), increasing the likelihood of adverse impacts to fish and fish habitats.

Potential adverse impacts to fish from recreation management would increase under Alternative C. Although the number of total acres in specific (not Lander General) SRMAs or ERMAs is greater (332,055 acres) under Alternative C, proposed restrictions on motorized travel that could benefit fish habitat are essentially the same or less than those under alternatives A and B.

Travel management under Alternative C is similar to Alternative A. Alternative C closes 451 fewer acres to motorized travel than Alternative A and 66,289 fewer acres than Alternative B. Alternative C designates open roads and trails on 50,776 acres (2 percent of the planning area), a decrease of 1 percent from Alternative A and a decrease of 6 percent from Alternative B.

Alternative C would result in a greater potential for adverse impacts to fish and fish habitat than alternatives A and B by increasing the potential for soil loss and subsequent sedimentation.

4.4.5.3.4.4. Special Designations

As opposed to the protections afforded fish and fish habitats by special management designations under the other alternatives, Alternative C does not designate any ACECs. Previously designated ACECs are open to mineral and realty surface-disturbing actions that can accelerate soil loss and add sediment to fish-bearing streams, either within or downstream of the area.

Alternative C does not close WSAs to motorized and mechanized travel except in the Dubois Badlands WSA. Eligible segments on Baldwin Creek and Sweetwater River are not recommended as suitable for inclusion into the NWSRS and are managed with other resource and resource use prescriptions for the area. Alternative C includes substantially fewer protections from surface disturbance that would increase the likelihood of adverse impacts to fish and their habitats within or downstream of these special management areas. Beneficial impacts to fish habitats in the Popo Agie and Sweetwater rivers, as described for alternatives A and B, would not occur under Alternative C.

4.4.5.3.5. Alternative D

4.4.5.3.5.1. Program Management

Alternative D applies timing limitations to all surface-disturbing activities that would adversely impact spawning, egg production, and fry areas in fish-bearing streams. On a case-by-case basis, Alternative D allows actions that result in the removal or depletion of water from fish-bearing streams, unless the action would result in the loss of a sustainable fish population. In addition, human-caused barriers to fish passage are removed on a case-by-case basis. In areas where conservation populations are threatened by hybridization or competition with other species, fish passages are built and barriers are removed or installed to mitigate these threats. Alternative D would result in slightly fewer adverse impacts to fish and fish habitats than alternatives A and C, and fewer beneficial impacts than Alternative B.

4.4.5.3.5.2. Resources

Alternative D would result in fewer impacts to fish and their habitat from fugitive dust, soil erosion or compaction, and excess runoff or sedimentation of water resources than alternatives A and C, and more than Alternative B. Under Alternative D, cumulative short-term soil disturbance in the planning area during the planning period is expected to be approximately 53,894 acres, approximately the same as Alternative A, 28 percent less than Alternative B, and more than 66 percent less than Alternative C. Cumulative long-term surface disturbance is expected to be approximately 11,453 acres, approximately the same as Alternative A, 35 percent more than Alternative B, and more than 400 percent less than Alternative C.

Alternative D closes lands with wilderness characteristics in the Little Red Creek Complex to motorized travel and limits mechanized travel to designated routes. Beneficial impacts to downstream fish habitats from reducing the potential for soil erosion would be slightly less than under Alternative B, and greater than under alternatives A and C.

Forest management under Alternative D allows clear-cuts and other harvest techniques in consideration of other resource values and silvicultural objectives. Similar to alternatives A and C, Alternative D could increase the potential for soil erosion and sedimentation of fish-bearing waterbodies from vegetative cover loss related to clear-cuts, cutting on steep slopes, and associated road building. Alternative D would result in more impacts to fish and fish habitats from forest management than Alternative B.

Alternative D includes more acres of wildfire and fuels treatments than alternatives A and C, but less than Alternative B. Adverse and beneficial impacts to fish and fish habitats under Alternative D from fuel and fire management would be the same Alternative A.

Impacts from management actions under Alternative D that disturb vegetation communities and subsequently adversely impact fish habitat would be similar to those under alternatives A and C, and less beneficial than those under Alternative B. See the vegetation subsections of the *Biological Resources* section for a more detailed discussion of vegetation management.

Alternative D treatment of INNS uses the same approach to controlling the spread of weeds as Alternative B. Alternative D management is directed at livestock flushing and the adjustment of terms for any authorized activity believed to contribute to the spread of INNS. Alternatives D and B would result in greater beneficial impacts to fish and fish habitat than alternatives A and C, by taking management actions that can reduce the establishment of INNS and reduce the need for INNS treatment actions.

Alternative D considers forage requirements for big game when making forage allocations in the planning area. This action would reduce competition and the potential for over-utilization of streamside vegetation that can lead to increased water temperatures that adversely impact fish. Alternative D would result in greater beneficial impacts to fish and fish habitats from forage management than alternatives A and C, and a less beneficial impact than Alternative B.

Protections for cultural, paleontological, and visual resources are somewhat more restrictive under Alternative D than under Alternative A, much more restrictive than Alternative C, and less restrictive than Alternative B. Fish habitats in areas of cultural, paleontological, and visual resources would be protected from the impacts of soil erosion and sedimentation of waterbodies from surface-disturbing activities.

4.4.5.3.5.3. Resource Uses

Compared to management actions for resource uses under the other alternatives, Alternative D is very similar to Alternative A, less restrictive than Alternative B, and more restrictive than Alternative C.

Compared to alternatives A and C, Alternative D opens fewer acres to mineral exploration and development activities that can cause soil disturbance and increase the potential for sediment to enter fish-bearing waterbodies. Closing lands to surface-disturbing activities reduces the risk of adverse impacts from soil loss and movement to fish and their habitats. Actions associated with these activities on BLM-administered lands during the planning period are expected to produce approximately 20,302 acres of short-term disturbance, 4 percent less than Alternative A, 23 percent more than Alternative B, and 5 percent less than Alternative C. Long-term disturbance is estimated at 9,395 acres, 5 percent less than Alternative A, 27 percent more than Alternative B, and 6 percent less than Alternative C. Alternative D would result in greater beneficial impacts to fish than alternatives A and C, and more adverse impacts than Alternative B, which opens the fewest acres to mineral-related surface-disturbing activities. Like Alternative B, closing the area to the east of Boysen Reservoir to oil and gas leasing would beneficially impact fish and aquatic resources in this area.

Alternative D opens 459,720 acres (19 percent of the planning area) to wind-energy development, which is substantially fewer acres than alternatives A and C, and more acres than Alternative B. Similarly, 19 percent of the planning area is open to ROWs and more acres are managed as ROW exclusion or avoidance areas (972,794 acres and 961,696 acres, respectively) than under alternatives A and C. Alternative D designates utility corridors on 53,599 acres, approximately 25 percent fewer acres than Alternative C and approximately 2 percent more acres than Alternative B. Alternative D would result in less risk of soil erosion and stream sedimentation from wind-energy and ROW development than alternatives A and C, and more risk than Alternative B.

Alternative D allows livestock grazing on 2,318,621 acres (97 percent of the planning area), 6,313 fewer acres than alternatives A and C, and 6,526 more acres than Alternative B. Alternative D opens Sweetwater Canyon to grazing, which could result in more adverse impacts to the trout fishery from the reduction of bank vegetation and increased sedimentation than Alternative B, which closes the area to livestock grazing. Alternative D closes additional lands in the East Fork ACEC to grazing, which would beneficially impact fish habitat in the area by eliminating the impacts of soil loss from grazing activities. Alternative D would allow the use of range improvements and higher utilization levels when combined with a Comprehensive Grazing Strategy. The potential for adverse impacts to fish and fish habitats under Alternative D is the same as under alternatives A and C, but adverse impacts could be offset by better vegetation management resulting from the grazing strategy. Alternative D would result in more beneficial impacts to fish and fish habitat from grazing management than alternatives A and C, but more adverse impacts than Alternative B, which requires lighter utilization levels and uses fewer range improvements, thus generating less surface disturbance, to manage livestock.

Impacts to fish and fish habitats from recreation management are the same as Alternative B, except that SRMAs and distinct ERMAs constitute 12,642 fewer acres under Alternative D than under Alternative B. Mineral, realty, and travel management in these areas is more constrained under Alternative D than under alternatives A and C, which would have a beneficial impact on fish resources by reducing soil erosion/loss from these actions. Alternative D would result in greater beneficial impacts to fish resources than alternatives A and C, and fewer beneficial impacts than Alternative B.

Travel management under Alternative D closes 25,425 acres (1 percent of the planning area) to motorized travel, an increase over alternatives A and C of 19,502 and 19,953 acres respectively, and a decrease of 46,336 acres from Alternative B. Alternative D allows motorized travel on designated roads and trails on 154,912 acres (6 percent of the planning area), 5 percent less than Alternative A, 20 percent less than Alternative B, and 200 percent more than Alternative C. Alternative D would result in less potential for adverse impacts to fish and fish habitat from soil loss and sedimentation than alternatives A and C, and more potential for adverse impacts than Alternative B. Under all alternatives, most of the planning area is open to existing roads/trails and impacts would be the same as described for Alternative A.

4.4.5.3.5.4. Special Designations

Alternative D designates 245,037 acres (10 percent of the planning area) into eight ACECs, 5 percent more of the planning area than Alternative A, and 52 percent less than Alternative B.

There are no ACECs proposed under Alternative C. ACECs support habitat for fish, although fish are not the primary reason for the special designation. Constraints for resource uses related to mineral, realty, and travel management authorizations in ACECs are more restrictive of activities that cause soil erosion that can lead to increased sediment loads in fish-bearing waterbodies. In addition to the beneficial impacts from ACEC management, special management prescriptions that limit surface disturbance in the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area primarily related to mineral and ROW development would also benefit fish resources within the area. Alternative D is less restrictive than Alternative B, but more restrictive than Alternative A. Alternative D would decrease the likelihood of disturbance to fish and fish habitat that could occur under Alternative C, which does not designate any ACECs or special management areas.

Alternative D closes more WSA acres to motorized travel or designates open roads/trails on more acres than alternatives A and C, which would decrease the potential for adverse impacts from additional sediment entering fish habitats. Like Alternative B, Alternative D recommends eligible segments on Baldwin Creek and Sweetwater River as suitable for inclusion in the NWSRS and manages them to maintain or enhance the segment, including fish habitat.

Overall, Alternative D management of special designation would result in greater beneficial impacts to fish resources than alternatives A and C, and fewer beneficial impacts than Alternative B.

4.4.6. Fish and Wildlife Resources – Wildlife

Wildlife habitat is found on almost every acre of land in the planning area. It is anticipated that most activities on public lands have the potential to adversely or beneficially impact wildlife. Wildlife health is directly related to overall ecosystem health, habitat abundance, habitat fragmentation, and wildlife security provided; therefore, most resource management actions would result in at least an indirect impact to wildlife. Impacts to wildlife species are generally described as the loss, degradation, or fragmentation of habitat or key habitat features; the disturbance/disruption of wildlife during sensitive time periods; or direct animal mortality. Management actions that impact wildlife and their habitats include resource uses that result in surface disturbance and disruptive activities, such as mineral development, lands and realty actions, livestock grazing projects, fire, recreation, and vehicle travel. Management actions with potential to enhance wildlife habitat include management of soils, water, vegetation, special status species habitat, and special management areas.

Wildlife populations can fluctuate in response to natural factors such as cycles in the abundance of prey base or extremes in seasonal weather; therefore, it can be difficult to determine whether impacts to wildlife result from specific management actions or from population changes caused by these natural factors. In most cases, it is a combination of these factors.

4.4.6.1. Summary of Impacts

Authorized activities that disturb soil, remove vegetation, and result in habitat loss, modification, or fragmentation adversely impact wildlife. Actions that affect breeding and birthing activities, cause direct mortality, or cause animals undue stress or energy expenditures also adversely impact wildlife. Alternative B provides the greatest protection from surface-disturbing activities and disruptive activities, and therefore would result in the greatest beneficial impacts to wildlife and their habitats. Conversely, Alternative C is the least restrictive and provides the least amount of protection, and therefore would result in the greatest potential to adversely impact wildlife resources. Alternative D is similar in many respects to Alternative A, but Alternative D includes additional management actions that increase habitat protection in areas important to wildlife and other resources, particularly for special status wildlife species and in special designation areas.

4.4.6.2. Methods and Assumptions

Analyses of impacts to wildlife resources assess whether actions could result in loss, degradation, or modification of wildlife habitat and assess actions that could improve or enhance habitat. Impact analyses are based on Interdisciplinary Team knowledge of resources in the planning area, review of existing literature, and the professional judgment of BLM and cooperating agency experts. Impacts are quantified where possible, but in the absence of quantitative data, best professional judgment is used. Acres and percentages described are approximations and impacts are described using ranges of potential impacts, or in qualitative terms, if appropriate.

Surface-disturbing activities and other actions that remove vegetation, disturb soil, and change habitat characteristics, alter habitat quality and indirectly impact wildlife. Indirect impacts to wildlife also result from actions that alter habitats that make them unsuitable for future habitation by wildlife species.

Methods and assumptions used in this impact analysis include the following:

- The BLM would continue to manage wildlife habitats in coordination with the WGFD, which is responsible for managing wildlife populations.
- Impacts to wildlife species are based primarily on potential impacts to BLM-managed habitats. For each alternative, changes to vegetation types, either in quantity, quality, or increased fragmentation, are compared to baseline conditions. Adverse and beneficial impacts to vegetation types (i.e., wildlife habitats) are assumed to have a corresponding adverse or beneficial impact to wildlife species.
- Ground-disturbing activities could lead to modification (beneficial or adverse) of habitat and/or loss or gain of individuals, depending on the amount of area disturbed, the species affected, and the locations of the disturbances.
- Changes in habitat quality could lead to direct impacts and could cumulatively impact species survival.
- The exact locations of future surface-disturbing activities cannot be predicted at the RMP level. For analysis purposes, surface-disturbing activities are assumed to occur in vegetation types in proportion to their availability in the planning area. Impact acreage for vegetation types are not absolute, but serve as a relative comparison among alternatives. Impacts from oil and gas development activities are assumed to occur in areas of high and moderate oil and gas potential.
- Disturbance impacts to wildlife are evaluated by comparison to current management practices in the planning area; increased protections in time or space result in beneficial impacts, reduced protections result in adverse impacts.
- In most cases, disturbance of any component of a species habitat is detrimental, with the degree of detriment depending on the importance of the habitat component to the maintenance of the population.
- Prohibiting surface disturbance or occupancy is more restrictive and provides more protection for wildlife than avoiding surface disturbance or occupancy.

- Disruptive activities displace wildlife, although some wildlife species would adapt to the disruptions.
- Diverse and optimal habitats foster healthy, abundant, and diverse biological communities.
- Disturbance or disruptive activities during sensitive periods can adversely impact wildlife.
- The more acreage of habitat protected from fragmentation, the greater the beneficial impact to big game and other wildlife species.
- Management actions aimed at benefiting specific wildlife species can result in adverse or beneficial impacts to other wildlife species. Management actions that beneficially impact one wildlife species could adversely impact another.
- The potential for adverse and beneficial impacts to wildlife forage and hiding cover is expected to be commensurate with the level of forage utilization from livestock grazing.
- Changing or altering livestock grazing patterns could beneficially or adversely impact wildlife habitat and its use.
- Alternatives that provide the greatest protection of existing wildlife water sources are anticipated to result in the greatest beneficial impact to wildlife.
- The higher the road density in the planning area, the greater the potential to degrade the quality of adjacent wildlife habitat. The greatest impact comes with the initial introduction of roads to unfragmented areas. A secondary impact is the introduction of INNS into new areas.
- OHV use in high-priority habitats or during sensitive periods can adversely impact wildlife.
- The quality and quantity of winter ranges are generally considered to be the limiting factors on big game populations in the planning area. The ability of these areas to support wintering populations is a major factor in determining yearlong population levels.
- Substantial modifications to habitat suitability can impact the survivability and viability of populations (e.g., higher winter mortality and reduced reproductive success).
- Crucial winter ranges, parturition areas, and migration routes are critically important wildlife habitat.
- There is sufficient habitat to maintain current WGFD herd unit objectives.
- Success of mitigation depends on specific protective measures, past results, and the assumption that mitigation measures are properly implemented.
- The rate of habitat fragmentation from development/subdivision of private lands around Dubois and Lander will continue, which would adversely impact the quality and quantity of wildlife habitat in these areas and increase the importance of intermingled public lands.
- The rate of fencing on private lands would continue or increase during the planning period.
- Fencing can be an obstacle and/or potential hazard to big game movement and can adversely impact greater sage-grouse and other species.
- Water developments can be a tool to improve grazing practices and improve habitat, but can expand adverse impacts from grazing to new areas.
- Natural variability in wildlife health, population levels, and habitat conditions would continue. Periods of mild or severe weather and outbreaks of wildlife disease or insects/diseases that impact habitat could impact wildlife population levels.
- Landscape-level fire events, regardless of cause, would impact habitat and wildlife population levels.

4.4.6.3. Detailed Analysis of Alternatives

4.4.6.3.1. Impacts Common to All Alternatives

The impacts to wildlife and wildlife habitats under the alternatives would be similar, but the intensity of impacts would vary by alternative. Impacts to wildlife from program management;

other resources, including vegetation, wild horses, and cultural; and resource uses such as minerals, ROWs, recreation and travel management, and livestock grazing management; and special designations, including ACECs, historic and scenic trails, and WSAs are described under individual alternatives. Chapter 3 describes the various WGFD statutory wildlife categories of big game, trophy game, furbearing animals, predatory animals, small game, game birds, migratory game birds, and nongame, including raptors, neotropical migrants, mammals, reptiles, and amphibians. Because impacts would occur in habitats occupied by animals in multiple statutory categories, impacts are addressed collectively, with specific categories identified where appropriate.

Changes to or stressors (e.g., increased human presence and noise) on habitat components such as vegetation, water, and soil would be the most likely to result in direct and indirect impacts to wildlife. Surface-disturbing activities cause habitat fragmentation, loss, or displacement, depending on the types, amounts, and locations of activities.

Impacts to wildlife populations could result from the loss of habitats or key habitat features such as winter range, nest sites, or migration corridors. Changing habitat characteristics or quality can cause wildlife to avoid the area, resulting in a loss of available habitat. Disturbed lands not adequately reclaimed, fire management, road construction and use, facility construction and placement, field facility maintenance, ROW construction, range improvements, and wildlife avoidance areas around these disturbances can result in habitat loss. As the acreage of surface disturbance and level of human activity increases, the quality and quantity of wildlife habitats would likely be reduced. Seclusion areas for wildlife would become smaller and more dispersed in these areas, which could lead to a decrease in wildlife populations as a result of habitat loss. Areas with many access roads and surface disturbances could disrupt big game migration corridors that link crucial habitats. Migration routes could be altered or eliminated, changing some traditional wildlife use patterns on a regional level.

Habitat fragmentation occurs when a contiguous habitat is intersected, divided, or segmented by disturbing activities, resulting in less usable range, and the disruption in movement among seasonal habitats, transitional areas, and parturition areas. Fragmentation also results in the isolation of smaller, less mobile species; a loss of genetic integrity with species or populations; and an increase in abundance of habitat generalists that are characteristic of disturbed environments, such as predators and parasites (Harris 1984). Linear features such as roads and pipelines can fragment habitats and can act as barriers for some species.

Displacement from surface disturbance or disruptive activities moves animals into less desirable habitat and/or increases the competition for available forage with other wildlife species and livestock. In many areas, displacement results in wildlife using private agricultural lands to a greater extent. Density dependency thresholds of suitable habitats for these species could be met, which ultimately could decrease herd size and genetic variability and increase disease frequency. Impacts of human activity to big game and severe winter range include habitat and forage loss caused by surface-disturbing and other disruptive activities at any time of the year. Indirect impacts to wildlife occur from displacement and physiological stress from human presence and activity during sensitive life stages. A fleeing or displaced animal incurs additional impacts through loss of food intake and potential displacement to a poorer (lower) quality habitat. Chronic or continuous disturbance could result in reduced animal fitness and reproductive potential (Geist et al. 1978).

Wildlife can also be disturbed by human activities, potentially causing wildlife to abandon a nest, den, or home range. Disturbance during sensitive periods (e.g., winter and nesting) is known to adversely impact wildlife. Human activities, such as OHV use, recreation, energy facility O&M, and noise from equipment, impact some wildlife species. These activities are considered to be particularly detrimental to breeding and nesting raptors and wintering big game. Disturbance impacts range from short-term displacement and shifts in activities to long-term abandonment of home ranges (Yarmoloy et al. 1988, Miller et al. 1998, Connelly et al. 2000).

Some species of wildlife are more sensitive to noise and disturbance than other species, while other species habituate to certain types of noise or disturbance. Bowles (Bowles 1995) indicates that wildlife can abandon habitats or expend energy as a result of disturbance and can continue to exhibit a response even when they have adapted to the disturbance. Depending on the intensity and frequency of occurrence of the disturbance, incurring energetic expense due to human disturbance during critical periods (e.g., winter) can impact wildlife survival and productivity. The USFWS (USFWS 2002a) identifies courtship, nest construction, incubation, and early brooding as higher risk periods in the life-cycles of raptors when adults are more prone to abandon nests due to disturbance. The USFWS (USFWS 2002a) also indicates that human activities resulting in disturbance to raptors can cause population declines. In general, the more area subject to noise and disturbances from human activities or the higher the density of these activities, the more disturbance and adverse impacts to wildlife.

Because the precise locations of surface disturbances under the alternatives is unknown and because wildlife species utilize more than one vegetation type, the degree of impacts to wildlife from surface disturbance are anticipated to be directly related to the amount of surface disturbance. Long-term surface disturbance accounts for reclamation of some lands following short-term disturbance. Although proper reclamation can restore habitats and reduce long-term surface disturbance acreage, reclamation can have limited effectiveness in restoring suitable habitat, and the locations of permanent facilities (e.g., roads and well pads) adjacent to reclaimed areas can reduce the utility of reclaimed habitats.

Under all alternatives, impacts to wildlife from management of air quality and geologic, water, cave and karst, and visual resources would not vary by alternative. To the extent that management is directed at protecting these resources, there would be a secondary beneficial impact to wildlife and wildlife habitat. See resource-specific sections of this chapter for a description of impacts from these management actions under each alternative.

Resources

Soil

Surface disturbance temporarily or permanently removes wildlife habitats and can degrade the quality of adjacent habitats. For example, erosion and runoff from surface disturbance can extend onto adjacent habitats, causing additional soil erosion. Moreover, dust from surface disturbance can cover adjacent vegetation, thereby reducing photosynthesis and/or the palatability of vegetation. Depending on the intensity of degradation, season, and health condition of wildlife using the habitats, reductions in habitat quality can result in short-term and long-term impacts to wildlife. Surface-disturbing actions typically require BMPs to avoid or minimize impacts to soil resources and, ultimately, to habitats. Temporary protective surface treatments can have a beneficial impact on steep slopes or on soils with high potential for water or wind erosion because these areas are more difficult and often take more time to reclaim compared to other areas. All alternatives prohibit or avoid surface disturbance on steep slopes, with the degree of slope varying by alternative. Avoiding disturbance on slopes would provide a secondary beneficial impact to wildlife by limiting the amount of habitat available for surface-disturbing activities. Once surface disturbance occurs, timely reclamation is important to avoid or minimize soil erosion and the spread of INNS. The longer it takes to restore disturbed areas, the greater the adverse impact to wildlife.

Protection of soil resources has a direct beneficial impact on the production of vegetative resources on which wildlife depend for their habitat requirements. Under all alternatives, management actions that limit soil disturbance would beneficially impact wildlife and actions that disturb soil and remove vegetation would adversely impact wildlife and their habitats, unless vegetative treatments are performed to enhance habitat for a specific species. These impacts would affect wildlife in all statutory categories. Actions that disturb soil are discussed in resource-specific sections of this chapter.

Lands with Wilderness Characteristics

Habitats within areas considered to contain wilderness characteristics support suitable habitat for myriad wildlife species including grassland/shrubland-, forest/woodland-, and riparian-wetland-obligate species. Most importantly, these lands contain winter range for part of the Whiskey Mountain bighorn sheep herd.

Fire and Fuels

Prescribed fire and wildfire can result in short-term and long-term impacts to wildlife. Wildland fire can kill less-mobile wildlife, such as small game, ground-nesting birds, nongame mammals, and reptiles, that are not able to avoid the path of the fire. Wildland fire can cause short-term animal displacement, primarily to big game and trophy game species, and result in short-term or long-term habitat loss, depending on the types of vegetation removed and severity of the fire. In some cases, wildland fire has the potential to burn exceptionally hot, resulting in soil sterilization. Sterilization of soils could delay vegetation establishment on the site for many years, resulting in long-term loss of wildlife habitat. The removal of vegetative hiding cover, loss of forage, and loss of habitat from wildland fires would directly impact raptors, game birds, small game, and neotropical migrant bird species. The BLM generally uses prescribed fire outside the nesting season, limiting direct impacts to nesting birds.

Wildland fire can reduce dense understory in forest systems, which has mixed values for various species of wildlife. Fire-sensitive vegetation such as bitterbrush, which is an important browse species for big game, is often killed and its composition in the plant community reduced. Historically, less-intense wildland fire that did not affect entire wildlife populations created mosaics, resulting in variability in the vegetation seral stage, species composition, vertical stratification, and herbaceous understory. This situation beneficially impacts species that prefer open habitats, such as mountain bluebirds. Periodic wildland fire can rejuvenate over-mature, decadent shrub communities, improving the palatability and age class diversity of the shrubs.

Over the long term, wildland fire can generally improve habitat conditions for most wildlife species by releasing soil nutrients, reducing fuel loads, or setting back species such as trees that might be encroaching into other habitats such as grasslands and shrublands. Wildland fire would reduce dense understory that has mixed values for various species of wildlife. In vegetative climax communities, wildland fire would return the vegetative community to an earlier stage of succession, increasing forage and cover for a greater diversity of wildlife. Wildland fire can remove excess dead and dying vegetation, reduce hiding cover for prey species, and reduce potential thermal cover in winter. However, post-fire log and limb fall would increase horizontal cover and could produce snags important for nesting birds in the long term. The extent of impacts to wildlife depends on the extent of change in habitat structure and species composition caused by the wildland fire. Landscape-level wildfire could reduce vegetation and habitat across large expanses, which would displace many species of wildlife for the long term, if not permanently.

Fire-line construction, use of heavy equipment, and other fire suppression activities could damage or destroy vegetation and wildlife habitat. For example, using heavy equipment to construct fire lines can cause habitat loss, degradation, and fragmentation. Timely rehabilitation from this damage is important to maintaining the quality of wildlife habitats. If rehabilitation is not completed, fire suppression activities can cause erosion or INNS spread, which would result in long-term adverse impacts to wildlife habitat.

Vegetation

Forest management actions can impact feeding, breeding, and sheltering of raptors and other forest-dependent species. Habitat fragmentation and degradation, increased human presence, and habitat access by competitor species that normally cannot use these areas could all impact these species, depending on whether the action is a harvest or thinning, where the access roads are constructed, the types of equipment used, and the rate of habitat rehabilitation. The effectiveness of elk habitat in forested habitats declines with increased road densities. Forest and woodland habitats are used by a myriad of species from each wildlife statutory category and management actions to meet forest health objectives could result in habitat loss and fragmentation, displacement of animals, disturbances from noise, and increased impacts from vehicular traffic. Silvicultural practices in forest and woodland habitats can adversely impact black bears and mountain lions, because providing habitat for these species is generally not the focus of the management action. Management practices designed to alter or set back the seral stage of the forest community could increase wildlife species diversity and richness, depending on different species' habitat requirements. Species that require late seral stage habitat would lose habitat and be displaced, while species that require early to mid seral stage habitat would benefit from increased range.

Under all alternatives, aspen regeneration is promoted throughout the planning area using a variety of treatment methods to enhance wildlife habitat and improve overall ecological health. Aspen stands are found primarily in the Green Mountain, Dubois, and Lander Slope/South Pass areas and along Beaver Rim, and overlap with high-value big game, trophy game, game bird, and neotropical migrant habitat. These communities provide important forage and cover habitat, and management actions that focus on improving aspen health and regeneration would have beneficial impacts on wildlife in each statutory class. In all timber management activities, the practice of leaving dead and dying trees, trees with heart rot, and other standing unmerchantable timber would meet the ecological needs of numerous species, including woodpeckers, owls, and many neotropical migrants.

Manipulation of juniper and other noncommercial tree species and noncommercial harvest of minor wood products such as poles, firewood, and wildings would result in variable impacts to wildlife species. These impacts, including short-term disturbance of wildlife, minor modification of habitat due to removal of trees or wood products, and other general disruptions caused by temporary human presence, would result in minimal adverse impacts to wildlife resources.

Properly mitigated timber harvests can improve big game habitat in the long term by improving forest age class diversity and distribution, edge effect, and forage community diversity.

Conversely, timber harvests can take important habitat components (e.g., snags, dead and down components, and the largest trees) out of the ecosystem and result in adverse impacts to species that depend on these components. Amphibians, reptiles, and other smaller animals depend on these habitat components for survival. Thinning practices generally result in adverse impacts to species such as the snowshoe hare.

Grasslands and shrublands would be managed to meet the Wyoming Standards for Healthy Rangelands and for specific plant species and vegetative attributes (plant density, composition, cover, and diversity), which would directly impact wildlife habitat. Plant communities lacking a balance of herbaceous and woody components would adversely impact wildlife in the planning area, because most species depend on sagebrush/grass and mixed shrub communities, at least seasonally, to meet part of their forage, cover, or migration needs.

Under all alternatives, the BLM would utilize an integrated management approach, including mechanical and chemical treatment, fire, and grazing to manipulate vegetative communities to achieve wildlife habitat objectives. Maintenance of contiguous habitat blocks and the corridors between them would have beneficial impacts on many wildlife species that depend on large areas of habitat to carry out their life history requirements. In addition, corridors between habitat blocks are important for seasonal movements of wildlife. Appropriate reclamation would restore biological integrity and habitat function lost as a result of the initial surface-disturbing activity; however, returning a sagebrush site to predisturbance condition can take 30 or more years. Successful reclamation is needed to reestablish connectivity within previously fragmented habitats and to achieve and maintain ecosystem function.

Invasive Species and Pest Management

The spread of INNS contributes to the loss or degradation of wildlife habitats. Adverse impacts to wildlife habitats from INNS would be commensurate with the amount of wildlife habitat affected. Targeting and eradicating INNS particularly detrimental to certain wildlife habitats would beneficially impact wildlife using the area. For example, salt cedar is an INNS often found adjacent to or within water courses and riparian-wetland habitats important to numerous wildlife species. Actions to prevent and control INNS could reduce, or at least slow, the rate of INNS increase in the area and the severity of impacts to wildlife habitats. Controlling INNS under all alternatives would reduce competition with native species important to wildlife habitat and populations. Improved plant vigor, health, and forage production would maintain or improve forage production, cover, and vertical structure for wildlife. Increased forage availability and forage quality (nutrient content) increases wildlife fitness and survival. Controlling the spread of INNS is necessary to maintain habitats to support wildlife carrying capacities.

Under all alternatives, the required use of certified noxious weed-free forage and mulch would beneficially impact wildlife by reducing the opportunity for weeds to establish in key habitat features. Working with stakeholders to control grasshoppers and Mormon crickets would beneficially impact wildlife species in all statutory categories because infestations can adversely impact wildlife habitat quantity and quality. Impacts to wildlife from activities such as herbicide spraying can cause short-term animal displacement from vehicle use and human presence. Pesticide spraying can also cause short-term animal displacement and a loss of insects birds use for food. It is expected that insect control efforts would not result in the eradication of the insect population. Impacts to wildlife from the presence of INNS or INNS control methods would not vary by alternative.

Riparian-Wetland Areas

Riparian-wetland areas support the greatest biological diversity of all habitats in the planning area. Therefore, management actions that protect, develop, restore, and improve these areas would result in direct beneficial impacts to wildlife. Management of riparian-wetland areas to meet PFC and the Wyoming Standards for Healthy Rangelands improves habitat conditions for various wildlife species, including big game, furbearing animals, small game, migratory game birds, neotropical migrants, and amphibians. In addition to their importance to wildlife, riparian-wetland areas are important for livestock and wild horses, and concentrated grazing by all animals can lead to overuse of these habitats. Actions that improve riparian-wetland PFC would improve habitats for riparian-wetland-dependent wildlife species, especially via increases in the quantity and quality of riparian-wetland vegetation. Areas managed to standards greater than the minimum requirement of PFC would result in greater beneficial impacts to wildlife.

Fish, Wildlife, and Special Status Species

Impacts to wildlife species resulting from surface-disturbing and disruptive activities would be addressed through the implementation of mitigation measures and BMPs, such as timing stipulations and designations of spatial buffers, including those found in the WGFD *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (WGFD 2009). These stipulations provide some mitigation for loss of habitat function or habitat value for wildlife species. Big game are sensitive to human activity, and timing stipulations offer protection during critical birthing and winter periods. For example, mule deer exhibit a stress response to disturbances associated with noise and activity up to 0.29 mile from the source (Frisina 1992). Crucial winter range is considered the “limiting factor” to big game populations, and modifications to habitat suitability can impact species survivability and viability (e.g., higher winter mortality and reduced reproductive success), ultimately leading to reductions in population size. This impact is intensified on lands that are crucial winter range for more than one big game species and in areas where crucial winter range is in degraded or poor condition.

Surface-disturbing and disruptive activities are prohibited within identified big game crucial winter range from November 15 to April 30 and in big game parturition areas from May 1 to June 30 unless the BLM grants an exception, modification, or waiver. At present, 605,898 acres of crucial winter range and 27,768 acres of parturition habitat are identified on public land in the planning area. Raptor nest sites and associated buffers are protected during the nesting period, with nesting dates and buffer distances varying by alternative. Some raptor species are more sensitive to disturbance than others and disruptive activities can cause raptors to abandon nests or chicks, resulting in the loss of that season’s nest production. The BLM would adhere to fence standards for new fence construction to allow wildlife movement and would remove or modify existing fences that are a hazard to wildlife where opportunities exist. Impacts to wildlife would be minimized through appropriate placement of facilities and projects and maintaining connectivity of large blocks of undisturbed habitat.

The BLM would cooperate with the WGFD and the USFWS to reintroduce wildlife species, including special status species, into historic or suitable ranges to enhance existing populations or genetic diversity. In addition, the BLM would seek opportunities to develop wildlife viewing areas in the planning area.

In addition to the stressors from BLM-permitted activities on game animals (big game, trophy game, small game, furbearers, and game birds), many of these species are also hunted seasonally. Pursuit of game animals during hunting seasons can create additional short-term stressors. Hunting seasons vary from weeks to months, depending on the game species, and are designed to harvest animals to maintain established population objectives and/or maintain populations at or below the sustainable habitat carrying capacity. Adjustments in big game herd objectives would be recommended to the WGFD when habitat monitoring data indicate adjustments are needed.

The USDA Animal and Plant Health Inspection Service (APHIS) Wildlife Services conducts animal damage control, typically for coyote, red fox, and skunk. Impacts to predatory animals from control efforts would not vary among the alternatives.

Wildlife and special status species occupy the same habitats; therefore, there is a direct beneficial impact to wildlife in all statutory categories from actions that conserve habitat for special status species. All alternatives prohibit surface-disturbing and disruptive activities around greater sage-grouse leks, with the buffer distance varying by alternative. Protecting habitat from loss or fragmentation would beneficially impact wildlife species using the same areas. All alternatives apply a TLS on surface-disturbing and disruptive activities in nesting habitats for greater sage-grouse and mountain plover. The TLS would have beneficial impacts on other birds nesting in the area. Special status fish management would help protect and improve riparian-wetland ecosystems essential for wildlife. Actions that minimize impacts from road crossings in fish habitat and implement management strategies to prevent the introduction and spread of aquatic invasive species would result in indirect beneficial impacts to other wildlife species inhabiting the riparian-wetland areas. Actions directed at managing for vegetation diversity, managing to meet or exceed PFC in riparian-wetland areas, and improving sagebrush communities would beneficially impact all wildlife species.

Wild Horses

Wild horses compete directly with wildlife for water, forage, and habitat on 587,333 acres, or 25 percent, of the planning area, and the number of wild horses does not vary by alternative. Allowing horse populations to increase could allow expansion of wild horses into new areas, increasing the amount of competition between wild horses and wildlife. Higher numbers of wild horses can displace big game into less suitable habitats or onto private lands. Wild horses also contribute to riparian-wetland habitat degradation, which reduces the quality or suitability of these habitats for wildlife species. Wild horses that tend to dominate water sources can force wildlife to find alternative water sources. This can displace wildlife into lower-quality habitat or force wildlife to travel farther to find water. Wild horse use of small, isolated desert riparian-wetland systems can decrease the value of these areas for wildlife as a result of trampling, loafing, and forage reduction. The capability of these areas to support a diversity of wildlife can be reduced as vegetative cover, structure, and forage quality and quantity are reduced or altered.

Wild horse gathers would create short-term localized disturbance to wildlife from human activity related to gathers. Vehicle traffic, helicopter use, wranglers on horseback, and the movements of the wild horses during gathers would contribute to wildlife stress and displacement. Maintenance of the wild and free-roaming nature of wild horses would beneficially impact wildlife by promoting open spaces and minimizing fences, which would result in fewer obstructions to the movement of wildlife across the landscape.

Cultural and Paleontological Resources

Management for cultural and paleontological resources provides varying degrees of habitat protection under the alternatives. Cultural resource protection generally results in beneficial impacts to wildlife by restricting surface-disturbing activities. Cultural and paleontological inventories and excavations would result in short-term localized displacement of wildlife and a short-term loss of habitat at excavation sites. It is expected that adverse impacts associated with cultural and paleontological resources management would be limited to relatively small areas and would not vary among the alternatives.

Resource Uses

Minerals

Adverse impacts from mineral exploration and development include the displacement of wildlife in developed areas, wildlife avoidance of areas around development from noise and human presence, the reduction in usable habitat, and the disruption of migration corridors that link seasonal ranges. Adverse impacts would be greater in areas experiencing steady development and large amounts of surface disturbance. Surface disturbance that results in the loss of sagebrush habitat would be a long-term adverse impact because of the difficulty of establishing shrubs in reclamation areas due to the time it takes plants to establish and grow. Under all alternatives, it is anticipated that approximately 183 acres of long-term disturbance would occur each year from locatable mineral activities and another 183 acres of long-term disturbance would occur from mineral material disposals. A pre-FLPMA mineral withdrawal on 3,432 acres in the East Fork area is not subject to expiration and will be maintained under all alternatives.

Most oil and gas development is expected to occur in areas with high and moderate potential for both conventional gas and CBNG, primarily in the Lysite and Beaver Creek areas and south of Jeffrey City. Oil and gas development fractures vegetative communities, changes plant community structure and diversity, and alters grassland/shrubland landscapes. As the numbers of wells, roads, and facilities increase, habitats in and near well fields become less suitable until most mobile animals no longer utilize these areas. Although vegetation and other natural features might remain physically unaltered, wildlife make proportionately less use of areas near oil and gas facilities. The WGFD estimates that adverse impacts to pronghorn from oil and gas development would occur on at least 170 acres surrounding each well pad (WGFD 2009). The greater the mobility and adaptability of wildlife species to human activity and disturbed areas, the less likely there would be long-term impacts to species populations. However, it is feasible that big game behavior or populations would be altered in the long term at any level of development. Animals that remain within the affected zones would be subject to increased physiological stress. This avoidance and stress response impairs habitat function by reducing the capability of wildlife to use the habitat effectively. In addition, physical or psychological barriers lead to habitat fragmentation, further limiting the availability of suitable habitat. An area of intensive activity or construction would become a barrier when animals cannot or will not cross it to access otherwise suitable habitat. These impacts would be especially problematic if they occurred in limited habitat components such as crucial winter ranges and reproductive habitats (WGFD 2009). Studies have shown that actions involving increased human presence have resulted in adverse impacts to wildlife populations such as mule deer and greater sage-grouse. Due to prolonged reclamation time, oil and gas development in low precipitation areas could result in long-term impacts from habitat loss and fragmentation.

Long-term impacts would occur from habitat fragmentation associated with roads, utility corridors, construction, and long-term avoidance of development sites and facility locations. Potential impacts to wildlife would include temporary disturbance in localized areas, temporary loss of habitat, long-term degradation of habitat, and possible direct mortality of small mammals or nesting birds.

Oil shale leasing is the same under all alternatives because a land use plan amendment would be required prior to approval. The geothermal RFD did not identify any commercially viable geothermal potential, and it is expected that there would be no large-scale geothermal development in the planning area. If geothermal resources were discovered during the drilling of a gas well, impacts to wildlife would be the same as for drilling and completion of an oil and gas well, and no additional disturbance would be expected from geothermal leasing activities. Impacts to wildlife from geothermal development would be the same under all alternatives.

Extraction of phosphate would require stripping of the overburden to reach the phosphate deposit (strip mining), which would result in large-scale surface disturbance and habitat loss. Phosphate deposits in the planning area predominantly overlap big game winter range on Lander Slope, in Red Canyon, on Sheep Mountain, on Schoettlin Mountain, and near the Sweetwater River. If the BLM leased these areas for phosphate mining, there could be a long-term or permanent loss of habitat for mule deer and elk from mining operations.

Geophysical projects, particularly those involving the use of vibroseis trucks, can adversely impact sagebrush habitats by crushing sagebrush plants and understory grass and forb species. Staking and flagging of project areas, noise generated from vehicles and seismic work, and human presence could cause wildlife displacement within and adjacent to the project area. The extent of displacement would depend on the time of year of the activity. Pounding of the ground surface can disrupt breeding and nesting activities for birds and result in a loss of eggs or chicks. Less mobile species such as reptiles and nongame mammals can be crushed by the vibroseis plates or vehicle tires. Truck paths can create trails, thus increasing predator access. Wildlife displacement would be a short-term adverse impact because wildlife would likely return to the project area once operations ceased. Impacts from seismic operations would not vary by alternative; however, the number of acres open to geophysical activities does vary by alternative.

Mineral material disposals for sand, gravel, moss rock, granite, and limestone can impact vegetative communities depending on extraction methods for each specific resource. Impacts include wildlife displacement and disturbance, wildlife avoidance of the larger surrounding area because of noise and human presence, loss of vegetation, and loss or modification of habitat. However, limiting the acreage available for mineral material disposal may require longer transport distances for sand and gravel and other construction materials, potentially increasing the incidence of wildlife collisions with haul trucks. Salable mineral extraction would result in short-term direct impacts to wildlife and associated habitat. The level of impacts would depend on the size of the project area and the importance of the affected habitat to wildlife.

Lands

Lands with important wildlife habitats are considered when making land tenure adjustments in the planning area. The acquisition of lands would result in a direct beneficial impact to all species of wildlife because lands under BLM control are not available for subdivision and are subject to management decisions that consider impacts to wildlife. Land disposals could result in the long-term loss of habitat for wildlife. Lands identified for disposal have undergone an initial screening for impacts to wildlife and would be reevaluated before disposal to determine new or previously unidentified impacts to wildlife or key habitat features. Several parcels identified for disposal are in or adjacent to WGFD Wildlife Habitat Management Areas (WHMAs), and would have restrictions for disposal. These restrictions would ensure that disposal lands are managed for the same values and with similar prescriptions as surrounding lands.

Renewable Energy

Non-wind renewable energy development is considered on a case-by-case basis and wind energy would be developed consistent with the Wind Energy Programmatic EIS (BLM 2005a). The EIS provides guidance to consider micrositing alternatives when assessing the impacts of proposed facilities to wildlife, but does not discuss broader habitat avoidance issues. Because their footprints are large, wind turbines can cause habitat loss and fragmentation and wildlife avoidance of the area, resulting in long-term adverse impacts. Turbine blades can pull bat and avian species into their rotation, causing mortality. In addition, bats are susceptible to internal injuries and mortality from sudden changes in air pressure generated by turbine blades.

ROWs and Corridors

Impacts to wildlife from ROWs are determined by the location of the action, timing of the activity, and the success of reclamation of disturbed lands. Routing linear ROWs (e.g., pipelines, powerlines, and roads) where impacts would be least detrimental would help minimize fragmentation of sensitive habitats such as winter range, migration corridors, parturition areas, and nesting habitat. Routing decisions are made after site-specific NEPA analysis, and where possible, new utilities are placed in existing ROW corridors. However, habitat fragmentation would still occur as more ROWs are developed or as an area with multiple linear ROWs expands. Short-term adverse impacts would result from the construction of pipelines, buried fiber-optic cables, and other subsurface actions; however, proper reclamation would restore some level of wildlife habitat function. Depending on the soil and vegetation types where actions occur and the long timeframes required for some disturbed sites to return to predisturbance vegetative condition, some impacts to wildlife would be long-term. Aboveground ROW actions, such as communications sites, powerlines, and wind turbines, would result in long-term habitat loss. These types of permanent structures are particularly hazardous to avian wildlife because of the potential for collision or electrocution (Erickson et al. 2005).

ROWs and corridors occur in the planning area under all alternatives and could impact wildlife in various ways. For example, utility poles benefit raptors and other birds by providing perching or nesting structures; however, these same utility structures also can cause mortality to raptors through electrocution and collisions (USFWS 2002a). Erecting artificial nest platforms on utility structures can have beneficial impacts to birds such as osprey, eagles, and hawks, and nest boxes constructed on utility structures can have beneficial impacts to cavity-nesting birds (e.g., bluebirds) and bats (USFWS 2002a). These structures can also adversely impact prey species because raptors will use utility structures as hunting perches. Reclamation on pipeline corridors can be difficult where there is uncontrolled grazing on plant seedlings or repeated disturbance of the site. When these situations occur, disturbances from pipelines would result in long-term adverse impacts to wildlife habitat.

Livestock Grazing Management

Livestock grazing would result in direct competition with wildlife for forage, water, and space. Wildlife disturbance or displacement can result from the construction and maintenance of range improvements. The development of livestock grazing strategies, such as emphasizing the creation of grass banks, would provide the opportunity to improve or maintain range conditions that support a diversity of wildlife species. Management of BLM-administered lands to meet Wyoming Standards for Healthy Rangelands would result in actions that would balance the impacts of grazing while sustaining wildlife species and their habitat. Livestock grazing could degrade wildlife habitats through harvesting of vegetation, changes in plant composition, soil disturbance and compaction, and INNS transport. Proper management of livestock grazing, deferring grazing on pastures exposed to wildland fire, and monitoring forage utilization could avoid or minimize adverse impacts to wildlife. Livestock tend to concentrate in riparian-wetland areas also important to wildlife, resulting in impacts to the quality and quantity of vegetation available for security cover and forage. If grazing occurs during the late or post-growing season, vegetation might not be available for wintering wildlife on crucial winter ranges and for security cover for nesting birds the following spring. This could lead to increased predation and lower nesting success.

While there could be adverse impacts to some wildlife species from livestock grazing, there could also be beneficial impacts to other species. Livestock grazing can enhance forage and habitat conditions for wildlife by increasing the palatability of forage, benefiting all grazing animals. Livestock grazing practices impact specific species in different ways. Cattle diets overlap to a high degree with those of elk and bighorn sheep, and domestic sheep diets have a high overlap with pronghorn and mule deer diets, creating year-round competition for forage among livestock and big game species. When cattle are removed during winter months from elk crucial winter range, it eliminates most of the competition for space between these two species during this critical period. Competition for space between cattle and bighorn sheep is considerably less because of the steeper and rougher topography sheep inhabit. Winter use by domestic sheep can cause competition with mule deer and pronghorn on their respective crucial winter ranges. Conversely, summer and fall cattle use of grasses balances wildlife use on pronghorn and mule deer crucial winter range, which appears to maintain a more diverse and healthy mixture of grasses and shrubs in these habitats. Under all alternatives, the BLM continues to manage lands in the Whiskey Mountain bighorn sheep area in cooperation with the WGFD and the USFS and in accordance with recommendations of the statewide bighorn/domestic sheep report. Domestic sheep use would not be authorized in this area to prevent the possibility of disease transmission to the resident bighorn sheep population.

Range improvements, such as fencing and water developments, are designed to assist in the management of livestock grazing distribution and use patterns, which impacts wildlife in various ways. Under all alternatives, forage supplements used to facilitate livestock distribution must be safe for wildlife. Existing fences, particularly those that do not conform to BLM standards for fence construction, create travel barriers, alter distribution patterns, increase stress and energy loss, and cause injury or death from entanglement. Fences become a larger concern during periods of deep snow and late in the winter season when animal body condition is poor. New fences constructed to BLM standards would present the same impacts to wildlife, but to a lesser degree. Fences create hazards for flying birds, perches for avian predators, and fragments seasonal habitats. The indirect beneficial impact of fences is the control of appropriate levels and durations of livestock grazing, which improves health, vigor, cover, and production of vegetation important to wildlife.

In the immediate vicinity of new water developments, livestock use intensifies and plant harvest increases. Water developments provide the opportunity to defer or rest certain habitats from livestock grazing to improve vegetative values that would have beneficial impacts on wildlife species. Development of offsite water sources could beneficially and adversely impact wildlife. Development of offsite water in areas lacking water can benefit wildlife by providing additional water in arid areas. Offsite water can also allow streams and/or water sources to be fenced out, providing quality wildlife habitat. However, creating additional water sources can increase livestock use in areas heavily used by wildlife. Increased grazing use can degrade the value of these habitats wildlife depend on by removing vegetation, altering plant community structure and composition, trampling of ground-nesting birds or small mammals, and displacement of wildlife.

Recreation and Travel Management

Wildlife can be directly disturbed by recreation activities, potentially causing wildlife to abandon a nest site or home range. Disturbance during sensitive periods (i.e., winter and nesting) could adversely impact wildlife populations. The impact from disturbances can be short-term, where the population could be displaced or shift its activities, or long-term, where the population could permanently abandon its home range, threatening its viability. Maintenance or improvement of existing sites or development of new recreation sites would cause short-term displacement of wildlife in the immediate area. There would be small amounts of habitat disturbed in association with maintenance and development activities, which would reduce the availability of that habitat. Because most animal species generally avoid human activities, this could reduce wildlife use of adjacent areas.

OHV use, mountain bikes, and intensive hiking can disturb wildlife. These activities remove vegetation, disturb soil, and transport INNS, which degrade wildlife habitats. In addition to direct impacts of vegetation removal and soil disturbance, the disturbance to wildlife associated with OHV use comes from the movement and noise of vehicles and riders. Road construction activities, mineral exploration and extraction, recreation, and vehicle travel can cause noise that adversely impacts wildlife.

Dispersed recreation activities such as hiking, biking, camping, fishing, hunting, rock climbing, and sightseeing result in increased human presence and would result in localized impacts to wildlife species. Human presence and activity result in both direct impacts to wildlife from hunting and vehicle collisions, and indirect impacts from wildlife displacement and physiological stress at any time of the year. Rock climbing on cliff walls that support nesting raptors can cause nest or chick abandonment from prolonged periods of disturbance.

Transportation routes tend to fragment habitats and can act as barriers to some species, especially in severe winter conditions. A new road or trail into a previously roadless area would create the greatest amount of habitat fragmentation and facilitate the pioneering of other roads or trails, increasing the amount of habitat wildlife avoid and habitat degradation through vegetation loss. OHV use can alter wildlife seasonal use patterns and migration routes, changing some traditional use patterns. Wildlife seclusion areas can become smaller and more dispersed in some areas. Motorized vehicle use decisions that result in increased human presence would result in localized impacts to wildlife. Impacts include increased wildlife displacement, increased stress during important periods (e.g., winter and nesting), and habitat degradation.

Motorized over-snow travel on winter range can cause stress to wintering animals. Increasing the number of transportation routes can increase public access to areas that previously were relatively inaccessible to vehicles during winter and spring months. Travel management will become more important during the planning period, because increased demands for the use of public lands would increase the number of roads and the likelihood of additional proliferation of routes, legal or not, which would increase adverse impacts to wildlife. Vehicle-wildlife collisions could increase in areas of high wildlife use and high human activity. Limiting the acreage available for mineral material disposal may require longer transport distances for sand and gravel and other construction materials, potentially increasing the incidence of wildlife collisions with haul trucks. Closure and reclamation of unnecessary roads would reduce fragmentation and restore habitat integrity, while reducing the potential to disturb wildlife.

Road construction causes habitat loss by removing vegetation and compacting surfaces, which can promote soil erosion and runoff into wildlife habitats and degrade them. In addition to direct impacts, roads also contribute to habitat fragmentation and can establish barriers to some wildlife species. For example, Towry (Towry 1984) indicates that roads generally decrease habitat quality for mule deer for a distance of ½ mile either side of the road. Forman et al. (Forman et al. 2003) acknowledge that ungulates and large carnivores generally avoid buffer areas around roads. Forman et al. (Forman et al. 2003) identify mortality, habitat loss, and reduced habitat connectivity as the three ways roads impact wildlife. Wildlife mortality and loss of habitats due to road construction are direct impacts; vehicle speed and traffic volume generally have increased wildlife mortality due to vehicle collisions (Forman et al. 2003).

Special Designations

Management prescriptions for ACECs, national historic and scenic trails, WSRs, and WSAs that reduce or eliminate surface disturbance would beneficially impact wildlife. Protections aimed at conserving vegetation, limiting surface-disturbing and disruptive activities, and preserving wilderness characteristics would result in beneficial impacts to wildlife by preventing disruptive activities in sensitive habitats, and limiting habitat loss, fragmentation, and degradation.

The IMP for Lands Under Wilderness Review, which restricts surface-disturbing and other disruptive activities and manages for wilderness characteristics on 55,338 acres would have long-term beneficial impacts on wildlife utilizing habitat in the eight WSAs. Loss or alteration of wildlife habitat would be minimal because only uses that meet the non-impairment criteria would be authorized. Conversely, the management of WSAs requires the use of natural processes to the extent possible and generally does not allow surface-disturbing activities designed to benefit wildlife habitat, such as vegetative treatments, which could benefit lands in the WSA. Impacts to wildlife would not vary by alternative except for road and trail closure areas, which are addressed in the *Comprehensive Trails and Travel Management* section of this chapter.

Wildlife habitat adjacent to NHTs is also protected from development; however, the distance the protection extends either side of NHTs varies among the alternatives. Further analysis is provided under *Special Designations*.

4.4.6.3.2. Alternative A

4.4.6.3.2.1. Program Management

Management actions under Alternative A include reducing the footprint of surface-disturbing activities and facilities on a case-by-case basis to reduce adverse impacts to wildlife from habitat loss. In addition to protecting elk crucial winter range, Alternative A protects 166,525 acres of general winter range for elk from surface-disturbing and disruptive activities from November 15 to April 30.

Fences would be removed or modified, on a case-by-case basis, to address concerns about habitat fragmentation and limitations to big game movement. Fencing can impede big game movement and animals can become entangled in the wires when crossing the fence. Fencing that does not conform to BLM standards can prevent big game from migrating between seasonal ranges, which could force animals to use poorer quality habitats or result in animal death. Birds can strike fences during flight, which typically causes bird mortality. The development of livestock water projects, including wells, springs, and reservoirs, can beneficially impact wildlife if the water projects are developed in areas where water is scarce and the development does not result in undesirable concentrations of livestock. If projects are developed in sensitive or limited habitats, such as reptile hibernacula, crucial winter range, and parturition areas, the project could result in the long-term loss of habitat around the project site from concentrated livestock use.

Alternative A considers forage requirements needed to meet big game herd objectives on a case-by-case basis when making forage allocations. There can be competition for forage among big game, livestock, and wild horses in areas where animals occupy habitats at the same time or during years when forage production is limited. Alternative A manages vegetation on big game crucial winter range or parturition areas on a case-by-case basis to benefit big game species. When taken, these actions would beneficially impact wildlife and wildlife habitat.

Buffer zones around active raptor nests minimize disturbance impacts to nesting raptors. Alternative A applies a TLS to prohibit surface-disturbing activity within ¾ mile of raptor nests from February 1 through July 31, which would protect approximately 301,237 acres around known raptor nests. Some raptor species are more sensitive to disturbance than others and might require larger buffers to ensure they aren't disturbed during the nesting period. Protective buffers help to minimize, but cannot completely prevent, impacts to raptors because most species are mobile beyond these buffers. The impact from habitat degradation and loss would be commensurate with the amount of surface disturbance. Alternative A does not avoid surface-disturbing activities in reptile hibernacula.

Alternative A manages wind-energy development consistent with the Wind Energy Programmatic EIS ROD (BLM 2005a). Limited or sensitive wildlife habitats such as big game crucial winter range and parturition areas, raptor concentration areas, and greater sage-grouse leks and nesting areas are not specifically excluded from development. Wind turbines and associated infrastructure could make these habitats unusable to wildlife, which could result in localized population declines.

4.4.6.3.2.2. Resources

Lands with Wilderness Characteristics

Alternative A does not apply special management prescriptions for lands with wilderness characteristics. The majority of the lands managed under Alternative A lie within the existing Whiskey Mountain ACEC and are subject to ACEC management.

Fire and Fuels

It is anticipated that 300 acres per year would be treated through the use of prescribed fire and 500 acres would be treated using mechanical treatment methods to address fuels and fire concerns. Prescribed fire and mechanical treatments would beneficially and adversely impact wildlife. In situations where the fire is intense, temperatures could be high enough to destroy both the plants and the soil fertility on which the plants depend. Fire that removes the majority of timber and shrubs in habitats would result in long-term adverse impacts due to the length of time it takes for new timber or shrubs to establish and grow. However, in low-intensity, lower-temperature fires, plants might be only top-killed and could resprout with greater vigor. Fuels reduction through low-intensity burning also could beneficially impact wildlife by preventing loss of habitat from large landscape-level wildfires.

Alternative A allows full suppression strategies for wildland fire, including soil-disturbing activities, on a case-by-case basis. Full fire suppression in areas of sensitive wildlife habitats would result in indirect beneficial impacts to wildlife habitat in the short term; however, without the use of fire to regenerate plant communities, there could be long-term deterioration of wildlife habitat in full suppression areas. Suppression that includes the use of heavy equipment to construct fire lines would likely remove topsoil, which can affect a disturbed site's ability to reestablish vegetation, resulting in long-term loss of habitat. Vehicles and equipment that disturb soil can facilitate the establishment or spread of INNS on disturbed sites, reducing habitat quality for wildlife. Impacts to wildlife would be less if post-fire vegetation seeding is performed and reclamation is successful.

Fire suppression activities (e.g., vehicles, heavy equipment, pedestrians, and aircraft) could displace species that are sensitive to disturbance, such as roosting or nesting birds. Fire suppression activities in fish and amphibian habitats also could harm populations of these species as a result of the application of toxic fire-fighting chemicals in riparian-wetland areas. In addition, roads or other surface disturbance associated with fire suppression activities would likely increase sedimentation rates into riparian-wetland habitats.

Vegetation

Alternative A manages forests and woodlands in response to forest health, wildlife habitat, and demand for forest products. Forest insect and disease outbreaks are managed on a case-by-case basis and a variety of silviculture techniques are utilized to manage forest health and protect resource values, including wildlife habitats. Alternative A restricts clear-cuts to 25 or fewer acres and prohibits them within 100 feet of riparian-wetland areas. Restricting the size of clear-cuts would protect the amount of elk security cover that could be affected at any one time and reduce the potential for soil erosion. The riparian-wetland buffer would capture soil that moves off treated areas, protecting riparian-wetland habitats for use by wildlife. Areas affected by treatment would be replanted if vegetation does not regenerate naturally. Forest management practices under Alternative A would result in short-term adverse impacts to wildlife, but also would result in long-term beneficial impacts by treating insect and disease outbreaks, protecting riparian-wetland areas, and replanting affected areas, which ultimately improves habitat for wildlife.

Alternative A limits forest product sales, including sawlogs, posts and poles, firewood, Christmas trees, and burlwood, to the Green Mountain, Lander Slope/Red Canyon, South Pass, and Dubois areas. Tree or firewood cutting during sensitive seasonal periods for wildlife (e.g., winter and nesting) can cause nest abandonment or animal displacement. Timber harvest practices could lead to short-term impacts from increased human presence and wildlife harassment. Forest product removal can also increase hunting success by reducing hiding cover. Long-term impacts would include loss of security and calving cover, and displacement of elk to other portions of the habitat for long periods. Alternative A timber management activities would improve big game habitat by improving age class diversity and distribution, edge effect, and forage diversity.

Alternative A manages grasslands and shrublands to achieve the vegetation attributes described in the NRCS Ecological Site Descriptions. These attributes include the appropriate plant composition for the site and the pounds of forage the site should produce. Alternative A would beneficially impact wildlife, because site descriptions include a balance of grasses, forbs, and shrubs that would provide forage, security, and thermal cover needed for wildlife species in all statutory categories. On a case-by-case basis, soil and vegetation treatments would be used to increase rangeland forage production. Historically, treatments have predominantly focused on increasing grass production that has a beneficial impact on grazing animals including livestock, wild horses, elk, and bighorn sheep. Increasing grass production could reduce the amount of shrubs present on the site, which could result in adverse impacts to sagebrush-obligate and other shrub-obligate species, including small game, game birds, trophy game, reptiles, neotropical migrants, pronghorn, and mule deer.

Riparian-Wetland Areas

The BLM manages riparian-wetland areas to meet PFC and utilizes various site-specific management actions to move areas toward PFC where needed. Management actions include water developments in upland habitats to draw grazing animals away from riparian-wetland areas, exclusionary fences to eliminate use by livestock, wild horses, and some species of wildlife, and frequent herding of livestock away from the problem areas. These actions are anticipated to ultimately result in a riparian-wetland system with increased vegetation and structural diversity, leading to an increase in abundance and diversity of wildlife, particularly neotropical migrants. Although this management would improve wildlife habitat, because the PFC assessment methodology does not incorporate the habitat requirements of wildlife, additional management might be necessary to ensure that habitats provide conditions suitable to meet the life history requirements of various wildlife species. Alternative A prohibits surface-disturbing activities within 500 feet of water and riparian-wetland areas, which would beneficially impact wildlife by conserving vegetation and valuable habitat for multiple species occurring in or downstream of these areas.

Fish and Special Status Species

Alternative A allows BLM actions that result in the removal or depletion of water in fish-bearing streams on a case-by-case basis. There would be adverse impacts if projects are developed that substantially reduce water availability needed for wildlife, including amphibians, to meet their habitat needs.

Alternative A requires, on a case-by-case basis, surveys to determine presence or absence of BLM sensitive species be completed prior to authorizing actions on public land. If species are present, measures are required to protect the species and limit adverse impacts to their habitat. Beneficial impacts to other wildlife using these same habitats would occur if mitigation measures were applied. Surface-disturbing and disruptive activities are prohibited on or within ¼ mile of occupied greater sage-grouse leks and avoided in greater sage-grouse nesting habitat within 2 miles of occupied leks from February 1 to July 31. This action would provide long-term protection of 16,283 acres of lek habitat and short-term protection of 794,452 acres of nesting habitat on public surface. Protections that eliminate habitat loss or restrict activities during sensitive breeding and birthing periods would result in beneficial impacts to many sagebrush-obligate wildlife species that use these same habitats. Alternative A management prescriptions do not vary by greater sage-grouse Core Area or non-Core Area.

Alternative A allows water developments and new fences to be constructed in greater sage-grouse nesting habitats on a case-by-case basis. Livestock water projects can adversely impact the quantity of hiding cover available for songbirds and small mammals by facilitating increased harvest of standing grasses. Development of water can also beneficially impact wildlife by providing additional watering areas in arid areas. Fences can be hazardous to birds and big game movement because the animals can strike or become entangled in the fence wires, which usually results in severe injury or death.

Wild Horses

Alternative A does not specifically establish travel loops to facilitate wild horse viewing, and considers wild horse movement and genetic diversity for fencing decisions in HMAs. Where applied, decisions that limit or modify fences in HMAs would beneficially impact wildlife movement in the same areas.

Cultural and Paleontological Resources

Alternative A protects cultural and paleontological resources in the Warm Springs Canyon Flume area, around sacred and TCPs, and in the Beaver Rim and Bison Basin areas from surface-disturbing activities. Actions that prevent surface disturbance and subsequent habitat loss near these sites would beneficially impact wildlife. Management of cultural and paleontological resources that includes excavation would adversely impact wildlife, but that impact would be minimal (60 acres during the planning period).

4.4.6.3.2.3. Resource Uses

Minerals

Alternative A opens most of the planning area (99 percent) to locatable mineral exploration and development. Uranium and bentonite have the greatest potential to be present in the planning area. These minerals are not found throughout the planning area, but are generally limited to the Lander Slope/Red Canyon, Gas Hills, and Green Mountain areas. Where there are exploration and mining activities, so would there be adverse impacts to wildlife and their habitats. There is little opportunity under the 1872 General Mining Law to prevent or mitigate adverse impacts to wildlife other than for species listed under the ESA. Under Alternative A, mining activities would result in the loss, fragmentation, and modification of predominantly grassland/shrubland and forest/woodland habitats, loss of nests and young, mortality of less mobile animals, and displacement and disturbance from equipment noise, vehicles, and human presence. Alternative A closes approximately 16,004 acres of big game crucial winter range and 338 acres of big game parturition habitat to locatable mineral entry. The amount of habitat lost, fragmented, or altered would depend on the scale of mining activities.

Under Alternative A, the requirement for Plans of Operation for mining activities in the Lander Slope, Red Canyon, Dubois Badlands, Beaver Rim, Green Mountain, and South Pass Historic Mining Area, and NHTs ACECs would result in beneficial impacts to wildlife in these areas. A Plan of Operations gives the BLM some opportunity to mitigate surface disturbance and the impacts of project timing with the project proponent.

Alternative A withdraws a total of 22,322 acres of federal mineral estate in big game crucial winter range and elk and bighorn sheep parturition areas to locatable mineral exploration. These withdrawals would beneficially impact wildlife by ensuring habitat is not lost due to mining activities. There are two existing locatable mineral withdrawals for 11,040 acres of mineral estate in the Whiskey Mountain ACEC to protect bighorn sheep crucial winter range. Alternative A recommends that these withdrawals, implemented in 1990 and 2000 for a period of 20 years, be extended when they expire. There are three existing withdrawals covering 13,967 acres of surface and subsurface minerals in the East Fork ACEC. These acres were withdrawn to protect elk and bighorn sheep winter range and capital investments made by the WGFD in the area. Two of these withdrawals were implemented in 1953 and 1969 (pre-FLPMA) and do not expire. The third withdrawal was implemented in 1993 for a period of 20 years and Alternative A pursues an extension of the withdrawal.

Alternative A opens a total of 2,280,345 acres (95 percent) of public land in planning area to geothermal leasing and opens 2,380,925 acres (99 percent) of the public land in the planning area to oil and gas leasing. It is anticipated that approximately 770 acres would be disturbed each year under Alternative A through oil and gas development activities, 400 acres of which would be long-term. There would no additional acres disturbed through geothermal leasing under Alternative A. Alternative A applies a TLS for active raptor nests, big game crucial winter range, elk winter range, and big game parturition areas, which would result in short-term beneficial impacts. Alternative A opens 609,631 acres of big game crucial winter range and big game parturition habitat (25 percent of the planning area), which would result in surface disturbance from development activities and new road construction; this would adversely impact big game habitat. Lands open, including crucial winter range and parturition habitat, are subject to an NSO stipulation, which would result in long-term beneficial impacts to big game and other wildlife species occupying the same habitats. TLS and NSO stipulations would protect wildlife from impacts that result in physiological stress and the loss or abandonment of young or nests. Surface-disturbing activities allowed during the stipulated period would likely disturb and displace wildlife in the short term. Surface disturbance occurring outside stipulated period would cause habitat loss and fragmentation in these same habitats, and would result in long-term adverse impacts.

Large-scale development would result in greater levels of habitat loss and fragmentation because there would be more roads, pipelines, well sites, and powerlines than with wildcat wells or isolated small fields. Developments could adversely impact linkages between habitat patches needed to ensure connectivity of populations. Large-scale habitat loss and fragmentation combined with the increased level of human presence, vehicles, and infrastructure could cause wildlife to avoid the area, which would result in long-term adverse impacts.

Seasonal protections from surface-disturbing and disruptive activities do not apply to the maintenance and operation of oil and gas wells and facilities unless specifically identified in the project analysis and applied as a COA on the permit. These activities can stress and disturb wildlife during sensitive periods (e.g., winter and nesting) and would result in short-term and long-term adverse impacts. Alternative A closes and reclaims roads determined to be redundant and that contribute to higher then desired road densities or habitat fragmentation on a case-by-case basis. Habitat previously lost to road disturbance or avoided by big game, particularly elk, would be returned to usable habitat. This would result in long-term beneficial impacts to wildlife species in all statutory categories. Road development for permitted activities in sensitive or limited habitats (i.e., crucial winter range and parturition areas) can result in long-term habitat loss and avoidance by wildlife.

Alternative A opens the entire planning area to geophysical activities subject to COAs to protect wildlife. Areas closed to mineral leasing would likely not be authorized for geophysical activities due to incompatible resource values.

Alternative A opens a total of 2,240,104 acres (94 percent of the planning area) to phosphate leasing. It is expected that phosphate leasing and extraction could occur on approximately 42,291 acres identified as having potential for phosphate that are open to leasing. Alternative A closes phosphate leasing on 154,106 acres of federal mineral estate in ACECs and on lands within 500 feet of riparian-wetland areas. Alternative A opens 372,035 acres of crucial winter range and 157,445 acres of raptor nesting habitat having phosphate leasing potential; this would adversely impact wildlife if leases were developed. The greatest potential for phosphate development overlaps crucial winter range for big game, primarily elk and mule deer. The Lander Slope, Sheep Mountain, and Schoettlin Mountain areas support large concentrations of wintering elk and mule deer, and impacts from phosphate development would severely reduce the amount of crucial winter range available to support these herds. Development of leases in crucial winter range would result in the long-term, if not permanent, loss of habitat because the area would be stripped of vegetation and soil. Elk and mule deer populations would likely decline with the loss of suitable habitat. Closing the Red Canyon ACEC to mineral leasing would benefit elk and mule deer using crucial winter range and wildlife using riparian-wetland habitats in the area. Alternative A management of phosphate leasing in the Lander Slope ACEC offers some protections, but Alternative A does not close the area to phosphate leasing.

Alternative A opens 2,165,196 surface acres (90 percent of the planing area) to mineral material disposals. Of these acres, 494,892 overlap big game crucial winter range and parturition habitat, and 278,268 acres are in raptor nesting habitats. Alternative A closes 229,014 acres to mineral material disposals, primarily in riparian-wetland areas and in greater sage-grouse leks, and habitat loss in these areas would not be attributed to mineral materials disposals. Closing areas in sensitive wildlife habitats would result in long-term beneficial impacts to many species of wildlife.

Lands

In general, land acquisition or disposal actions would consider land tenure adjustment criteria with the goal that the exchange, acquisition, or disposal would increase public benefits, including wildlife resources. Any acquisition of land that includes high-value habitat can result in beneficial impacts to wildlife by maintaining or enhancing the habitat using BLM management restrictions or mitigation for surface-disturbing and disruptive activities. Any disposal of BLM-administered land with high-value habitat is typically avoided; such disposals could increase the risk of habitat loss through development activities because there would not be any BLM-required mitigation. Lands no longer administered by the BLM could also experience increased human presence that can increase disturbance to wildlife utilizing the area. All land tenure actions are analyzed site specifically, using a public process, to determine the public interest before making a decision. Consolidating land ownership through land tenure adjustments increases the manageability of lands and results in more contiguous blocks of habitat, which would beneficially impact wildlife. Alternative A identifies 8,053 acres for disposal by sale, exchange, or other methods, and makes an additional 1,475 acres available with restrictions on future use. Many of the lands with restrictions are in, or adjacent to, the East Fork and Whiskey Mountain ACECs and would require management similar to the adjacent lands. Access is a primary goal in land tenure adjustments, which could adversely impact wildlife by increasing human activity in areas currently inaccessible to the public.

Renewable Energy

Alternative A opens 2,113,512 acres (88 percent of the planning area) to wind-energy development consistent with the Wind Energy Programmatic EIS (BLM 2005a). It is expected that wind energy would be not be developed universally across the planning area, but only in areas identified as having high wind-energy potential. Allowing wind-energy development would create collision hazards for bats and avian species because they can collide with wind turbine blades, resulting in mortality of individual animals. Bats can also be killed from internal injuries related to rapid pressure changes caused by the turbine blades. Wind energy facilities result in habitat loss and human disturbance through construction and maintenance of wind towers and associated facilities, including high-voltage transmission lines. Wind energy infrastructure is considered permanent on the landscape, and therefore would result in permanent loss and fragmentation of wildlife habitat. Alternative A management actions that avoid or exclude wind-energy development on 280,697 acres would beneficially impact wildlife.

ROWs and Corridors

Alternative A opens 2,188,294 acres (91 percent of the planning area) to ROWs. Alternative A manages 205,916 acres as ROW exclusion areas, of which 134,606 acres are in big game crucial winter range or parturition areas, primarily in the Whiskey Mountain, East Fork, Red Canyon, and Sweetwater Rocks areas, and along the NHTs. This management would beneficially impact wildlife in the long term, particularly in areas with sensitive or limited habitats; it prohibits surface disturbance or aboveground structure ROWs that could result in the loss and fragmentation of habitats or become hazards to wildlife. Alternative A identifies 66,099 acres as ROW avoidance areas, which offers less protection from habitat loss and fragmentation than exclusion areas; however, large ROWs are generally not authorized in avoidance areas. Alternative A avoidance areas are in big game crucial winter range and parturition habitats, primarily in the Lander Slope, South Pass, Beaver Rim, and Green Mountain areas, which would result in long-term beneficial impacts to wildlife. The only utility corridor designated under Alternative A is the Energy Corridor 79-216 north of Lysite. Alternative A co-locates major ROWs with existing utilities on a case-by-case basis to minimize surface disturbance. Co-locating utility lines would result in long-term beneficial impacts to wildlife by eliminating or reducing surface disturbance in intact habitats. Because Alternative A does not mandate co-location or close other areas to major ROWs, there could be additional new routes, which would adversely impact wildlife through the loss or fragmentation of habitats.

Livestock Grazing Management

Alternative A allows livestock grazing on 2,324,934 acres (97 percent) of public land suitable for grazing in the planning area. It does not allow livestock grazing on 69,276 acres (3 percent of the planning area), including on previously closed allotments (which do not vary by alternative) and remaining lands deemed unsuitable for grazing (e.g., rock outcrops and roads). Of the lands open to grazing, 4,021 acres in the East Fork and Dubois Badlands area have not been actively grazed since 1993 because these lands were associated with private lands purchased by the WGFD for the Spence/Moriarity Wildlife Management Area (WMA). Most livestock grazing in the planning area is by cattle, and areas open to grazing overlap 60,232 acres of crucial winter range for elk and 6,848 acres of crucial winter range for bighorn sheep. Cattle grazing on elk and bighorn sheep crucial winter range predominantly occurs during spring, summer, and fall; therefore, direct spatial impacts would be limited. Livestock forage utilization would directly impact the forage available for wintering elk and bighorn sheep. Winter sheep grazing typically overlaps pronghorn winter and crucial winter range in the planning area and would adversely impact the quality and quantity of shrubs available for wildlife. Activities related to sheep herding (the presence of humans and dogs) would displace wildlife. Livestock forage utilization levels would be established on a case-by-case basis under Alternative A, which typically manages forage use to not exceed moderate utilization. There would be no direct competition for forage between livestock and wildlife on closed lands, which would beneficially impact wildlife. Alternative A prohibits salt or mineral supplements within ¼ mile of riparian-wetland habitats to prevent livestock congregation at water sources. This management action would beneficially impact wildlife species requiring riparian-wetland areas for water, forage, and hiding cover.

Range improvements can change livestock grazing patterns and alter the way wildlife use their habitats. Alternative A allows range improvements on a case-by-case basis, and it is expected that new projects would disturb approximately 43 acres each year during construction and/or development of projects. It is assumed that approximately two reservoirs and/or pits, three wells, two spring developments, and 15 miles of fence would be constructed each year during the planning period. New water developments constructed in big game crucial winter range would modify natural movement patterns, potentially leading to reduced quantity and quality of available forage for big game the following winter. Water can draw livestock into areas either not previously used or under-utilized, which can increase plant utilization and potentially alter the plant composition in these areas but could benefit vegetation in other areas. New fences would add to the 2,285 miles of existing fence on public lands in the planning area that can adversely impact wildlife movement and be a hazard to flying birds. Fences impede wildlife movement if they are not constructed to wildlife-compatible standards and even then, fences can adversely impact wildlife, particularly when considered on a cumulative basis. Existing fences having net wire, five or six wires, or wires too tall for wildlife to safely jump can prohibit big game movement and prevent wildlife from reaching seasonal habitats. Under Alternative A, fences and cattleguards would be modified or removed on a case-by-case basis to facilitate wildlife movement.

Recreation and Travel Management

Under Alternative A, there would be adverse impacts to wildlife from increased human activity along NHTs, the CDNST, and in areas surrounding developed recreation sites and campgrounds in the South Pass and Green Mountain areas, because wildlife tend to avoid areas having people, pets, and noise. Recreation activities during breeding and birthing/nesting periods can cause animals to abandon their nests and/or young. Lands around the developed recreation sites and campgrounds encompass 724 acres and are withdrawn (pre-FLPMA) from locatable mineral exploration and development under Alternative A. Alternative A does not apply special management prescriptions for intensive recreation areas, including Johnny Behind the Rocks, The Bus @ Baldwin Creek, Sinks Canyon climbing area, Dubois Mill Site, the Sweetwater River WSA, Sweetwater Rocks, and the Coal Mine Draw area, and manages these areas as a planning area-wide ERMA. Alternative A management is directed at protecting resources, which would result in some beneficial impacts to wildlife habitat by addressing adverse impacts from mechanized or motorized vehicle use, camping, rock climbing, and hiking.

Alternative A limits motorized travel predominantly to existing roads and trails on 2,226,504 acres (93 percent of the planning area), including the East Fork, Beaver Rim, South Pass Historic Mining Area, and NHTs ACECs. Alternative A allows OHV use off existing roads and trails to perform necessary tasks such as retrieving big game kills, repairing range improvements, and conducting mineral exploration activities where surface disturbance is less than 5 acres. Alternative A limits 163,075 acres (7 percent of the planning area), primarily in the Whiskey Mountain, Lander Slope, Red Canyon, and Green Mountain ACECs, to designated roads and trails. Areas where travel is limited to designated roads and trails reduces road density and habitat fragmentation and road proliferation in sensitive habitats, more than areas where travel is limited to existing roads and trails. If frequent OHV use occurs during critical periods (e.g., winter and birthing), adverse impacts to wildlife would increase, potentially leading to decreased health, mortality to individuals, or overall population declines. Alternative A closes a total of 5,923 acres (0.2 percent of the planning area) to motorized travel in the Dubois Badlands ACEC. Areas closed to motorized travel would beneficially impact wildlife by eliminating habitat loss caused by roads and reducing vehicle disturbance to animals using the area. Alternative A subjects a total of 111,002 acres (0.5 percent of the planning area) to seasonal travel closures, which would be implemented predominantly on Green Mountain and in the Lander Slope, Red Canyon, and Whiskey Mountain ACECs. In addition, Alternative A closes 14,729 acres in the Red Canyon area to over-snow travel, including motorized and nonmotorized use. These seasonal closure areas overlap big game winter range and parturition areas, which would result in direct beneficial impacts to wintering elk and bighorn sheep. The Red Canyon area supports a large population of elk during winter and is a desired area to collect shed antlers. The over-snow travel closure would protect big game from disturbance and harassment from over-snow vehicles during the stressful winter and spring months.

4.4.6.3.2.4. Special Designations

Alternative A designates nine ACECs totaling 119,622 acres (5 percent) in the planning area, which would protect wildlife and associated habitat from surface-disturbing activities and related disruptive activities. ACEC management includes (1) closing lands or applying NSO stipulations for mineral leasing, (2) requiring a Plan of Operations for locatable mineral development and maintaining locatable mineral withdrawals in the Whiskey Mountain and East Fork ACECs, (3) prohibiting or limiting motorized vehicle use, and (4) avoiding major ROWs. Potential adverse impacts to wildlife could be mitigated to some degree from the requirement for a Plan of Operations before locatable mineral exploration in an ACEC. This requirement would allow the BLM an opportunity to identify and address potential impacts to wildlife with the mining proponent; however, the 1872 General Mining Law gives preference to the mining proponent over the protection of wildlife habitat.

The Whiskey Mountain, East Fork, and Red Canyon ACECs are in, or adjacent to, WGFD's Whiskey Basin, Inberg/Roy, and Red Canyon WHMAs and the Spence/Moriarity WMA, all of which were established to protect and provide big game crucial winter range. BLM management of the ACECs complements WGFD management of its lands, and all the lands together provide the majority of the big game winter range in these areas. Alternative A manages the Whiskey Mountain and East Fork ACECs to provide the greatest degree of habitat protection (closed to oil and gas and other mineral leasing, withdrawn from locatable mineral entry, and avoided for major ROWs) and prevent habitat loss and fragmentation on irreplaceable winter range. Alternative A manages the Red Canyon, Lander Slope, and Green Mountain ACECs with less restrictive prescriptions (NSO for mineral leasing, open for locatable mineral entry, and avoided for major ROWs). In addition, Alternative A closes big game crucial winter range in the Red Canyon ACEC to phosphate leasing. These management prescriptions would result in long-term beneficial impacts to wildlife. Alternative A manages the WSA lands in the Dubois Badlands ACEC in accordance with the WSA IMP and manages lands with wilderness characteristics with standard stipulations. WSA lands receive a higher degree of habitat protection than lands with wilderness characteristics; therefore, habitat could be lost or fragmented on lands with wilderness characteristics. Alternative A closes the East Fork ACEC and much of the Whiskey Mountain ACEC to livestock grazing to make all forage available for wildlife. Alternative A seasonally closes the Whiskey Mountain, Red Canyon, and Green Mountain ACECs to vehicle travel during winter to protect big game from disturbance that could cause additional stress. The East Fork ACEC is essentially closed to vehicle travel during winter because the surrounding WGFD lands in the Inberg/Roy WHMA are closed. Management actions under Alternative A would result in direct long-term beneficial impacts to big game species, primarily bighorn sheep, elk, and mule deer, and to wildlife species in all the other statutory categories that utilize these areas.

Alternative A management actions for a portion of the Beaver Rim ACEC are less restrictive to minerals, ROW, and surface-disturbing activities that could result in long-term loss or fragmentation of wildlife habitat. The ACEC is designated in part to protect raptor nesting habitats, and activities that would alter suitable nest or perch sites would likely cause raptors to avoid the area. Protections aimed at limiting surface-disturbing activities in the South Pass Historic Mining Area and NHTs ACECs would result in beneficial impacts to wildlife in these areas.

NHTs do not impact wildlife. However, to the extent that Alternative A restricts surface-disturbing and development activities within ¼ mile either side of trails, this management would beneficially impact wildlife habitat for species in all the statutory categories. Alternative A does not specifically manage lands adjacent to the CDNST; therefore, there would be no direct beneficial impact to wildlife species. Alternative A does not specifically manage NWSRS-eligible waterway segments along approximately 21 miles in the Baldwin Creek and the Sweetwater River with WSR-specific prescriptions, but manages them in accordance with the Lander Slope ACEC and Sweetwater Canyon WSA prescriptions, respectively. ACEC and WSA management that protects the overall stream values and maintains habitat in its present condition would beneficially impact wildlife.

Overall, Alternative A management prescriptions would result in long-term beneficial impacts to wildlife on 169,229 acres (7 percent) of the planning area. Wildlife on adjacent non-federal lands in the Whiskey Mountain, East Fork, Lander Slope, and Red Canyon areas would likely experience similar beneficial impacts because of the management of adjacent BLM-administered lands and the presence of several private land conservation agreements.

4.4.6.3.3. Alternative B

4.4.6.3.3.1. Program Management

In all cases, Alternative B requires surfacing-disturbing activities and facilities to have the smallest footprint practical so as to minimize the impacts of wildlife habitat loss and fragmentation and avoids such disturbances within 1,000 feet of identified reptile hibernacula. The BLM would work with project proponents to identify ways to minimize the size of surface disturbances, such as reducing pipeline construction widths, utilizing multi-well pads and directional drilling, and co-locating communication sites. This action would limit the overall number of acres disturbed and number of surface facilities on the landscape, which would reduce adverse impacts to wildlife from habitat loss and fragmentation. Alternative B would result in greater beneficial impacts to wildlife than Alternative A.

Alternative B excludes wind-energy development in big game crucial winter range and parturition areas, raptor concentration areas, and within 3 miles of greater sage-grouse leks. The *Special Status Species – Wildlife* section describes additional greater sage-grouse wind energy management actions. Wind-energy developments have large footprints and require a large number of acres to accommodate facilities, powerlines, and roads. Prohibiting developments in limited and sensitive habitats would result in greater beneficial impacts to wildlife under Alternative B than under Alternative A.

The TLS afforded to big game crucial winter range and elk winter range is the same as Alternative A, but Alternative B extends the TLS for active raptor nests from ¾ mile to 1.5 miles and designates specific dates for each raptor species. Alternative B protects 480,406 more acres during the raptor nesting period than Alternative A which would beneficially impact non-raptor nesting birds. Alternative B would result in greater beneficial impacts to raptors than Alternative A. Specifying nesting dates by raptor species would likely shorten the timing restriction period for surface-disturbing and disruptive activities compared to the Alternative A period which encompasses all nesting dates for raptor species. There would be no difference in impacts from raptor nesting dates between alternatives A and B, except for the burrowing owl and northern goshawk, whose nesting periods are not encompassed by the dates under Alternative A. Alternative B management would result in greater beneficial impacts to nesting burrowing owls and northern goshawks; these species are further discussed in the *Special Status Species – Wildlife* section.

Alternative B prohibits new road development in big game crucial winter range and parturition areas, unless it is determined that there would be no adverse impacts to big game species. Protecting sensitive habitats from loss or fragmentation would result in long-term beneficial impacts to wildlife. Reducing or eliminating vehicle traffic during the winter and birthing periods would limit animal displacement and stress. Under Alternative B, roads and trails identified as redundant in areas or where road densities are too high to maintain quality wildlife habitat would be closed and reclaimed. Habitat previously lost to road disturbance or avoided by big game, particularly elk, would be returned to usable habitat. These actions would result in long-term beneficial impacts to wildlife species. Reducing the number and miles of road in an area would reduce wildlife-vehicle collisions, habitat loss, and habitat fragmentation. Alternative B roads management would have greater long-term beneficial impacts to wildlife than Alternative A.

Alternative B does not allow new fences to be constructed unless necessary to address human safety issues, needed to exclude and/or protect wildlife, or where determined to not impact wildlife resources. Existing fences would be removed, when appropriate, to reduce habitat fragmentation and facilitate big game movement. Fencing that does not conform to BLM standards can prevent big game from migrating between seasonal ranges and force animals to use poorer quality habitats or cause animal mortality. Wildlife habitats currently unfragmented by fencing would remain unfragmented under Alternative B, and limiting and/or removing the number of fences in migration corridors would reduce risks associated with animals jumping over or crossing under fence wires. Alternative B management actions regarding fences would result in greater long-term beneficial impacts to wildlife than Alternative A.

Alternative B prohibits livestock water development projects in big game crucial winter range and parturition areas. Water developments, which can increase the amount of livestock forage harvest, could adversely impact wildlife if plant utilization increases substantially. Wildlife depend on vegetation being available, appropriate to the wildlife species, and in ample quantities to meet winter forage demands and nutritional needs in these limited habitats. Alternative B management would result in greater long-term beneficial impacts to wildlife than Alternative A.

Management under Alternative B would adjust livestock and wild horse forage allocations, where necessary, to make available the forage needed to meet big game herd objectives. Alternative B would reduce authorized livestock AUMs as necessary and would manage wild horse numbers at the lower end of the appropriate management level to provide forage for wildlife. Alternative B would manage forage utilization at a lower use level than Alternative A to ensure adequate vegetation remains for wildlife and plant health. Alternative B manages vegetation on big game crucial winter range and parturition areas to benefit the big game species requiring the range. These actions would result in greater long-term beneficial impacts to wildlife than Alternative A.

4.4.6.3.3.2. Resources

Lands with Wilderness Characteristics

Alternative B manages approximately 5,490 acres of the Little Red Creek Complex as non-WSA land with wilderness characteristics, and manages the area to protect wilderness characteristics. Through overlapping management of the Whiskey Mountain ACEC, most of the area is closed to mineral development, mining, livestock grazing and excluded from ROW development. These prescriptions would conserve wildlife habitat in these areas. Closing the areas designated as non-WSA lands with wilderness characteristics not located in the Whiskey Mountain ACEC to motorized and mechanized travel and managing them for naturalness and solitude would have beneficial impacts to resident wildlife species in all statutory categories. Habitats would remain unfragmented by roads under Alternative B, which would result in long-term benefits to wildlife. Occasional human presence and activity could result in short-term wildlife displacement.

Fire and Fuels

Under Alternative B, there would be approximately 1,000 acres of prescribed fire and 1,500 acres of mechanical treatment conducted each year to address rangeland fire and fuel concerns. Impacts would be the same as under Alternative A, but would occur on more acres. Assuming these treatments were carefully planned and implemented, there would be beneficial impacts to wildlife habitat by reducing the risk of wildfire, which would likely result in more adverse impacts than beneficial impacts. Fuels and fire management under Alternative B would use full suppression tactics, including the use of heavy equipment to address wildland fire, but only in high-priority areas for resource protection (identified WUI areas, developed recreation sites, areas of known cultural resources, and aboveground utility ROWs). Except for areas with known cultural sites, the other areas typically have limited value to wildlife; therefore, adverse and beneficial impacts to wildlife would be minor. Alternative B could result in increased risks to wildlife from landscape-level fires that would have both short-term and long-term adverse impacts to wildlife.

Vegetation

Alternative B focuses on letting forests and woodlands evolve naturally without using most traditional silviculture techniques, except in areas with public safety concerns or where forest health goals cannot be met. Forest management plans would be developed for the Green Mountain, Lander Slope/Red Canyon, South Pass, and Dubois areas to address forest product sales and management of forest insect infestations. Forest insect and disease outbreaks would be managed to address safety concerns primarily in WUI areas and around developed campgrounds. Wildlife typically avoid using forest habitats in WUI areas and campgrounds due to increased human presence and activity, noise, and pets. Not managing disease outbreaks can result in long-term loss of forest/woodland habitat. Areas affected by treatment would be replanted to meet forest health goals on a case-by-case basis, which would result in long-term beneficial impacts to wildlife dependent on timbered areas to meet all or part of their seasonal requirements. Alternative B does not allow forest product sales in the Lander Slope/Red Canyon and South Pass areas unless they are necessary to address public safety or are identified for wildlife habitat improvement. These areas contain sensitive habitats for wintering big game, trophy game, small game, raptors, and neotropical migrants. Less disturbance caused by noise and increased human presence related to tree or firewood cutting during sensitive seasonal periods would beneficially impact wildlife.

Alternative B manages grasslands and shrublands for biological diversity and to benefit wildlife, not necessarily to meet NRCS Ecological Site Descriptions. Management would focus on plant communities that improve wildlife habitat, such as managing for more shrubs on sites than identified in the NRCS Ecological Site Descriptions. Soil and vegetation treatments would be used where needed to improve plant diversity on the sites. Diverse plant communities would beneficially impact wildlife because each species has its own particular forage and cover requirements; generally the more diverse the habitat, the more species of wildlife it can support. Beneficial impacts to wildlife would be slightly greater under Alternative B than Alternative A, because wildlife needs would be the focus for managing grassland and shrubland habitats.

Riparian-Wetland Areas

Alternative B prohibits surface-disturbing activities within ¼ mile of surface water, riparian-wetland areas, playas, and delineated 100-year floodplains. This action would protect 820 more feet of habitat adjacent to or surrounding these areas from surface-disturbing activities than Alternative A, or a total of 125,403 more acres across the planning area. Habitats remaining available and unfragmented would result in direct beneficial impacts to wildlife.

Unlike Alternative A, which incorporates all types of management, including infrastructure to improve riparian-wetland health, management under Alternative B focuses on using the natural healing capacity of sites and reduced levels of livestock grazing to improve riparian-wetland areas toward PFC. Infrastructure-based projects, primarily offsite water developments and protective fencing, is de-emphasized and management actions, including closing roads, applying stipulations, and changing livestock grazing management, are emphasized. Less riparian-wetland fencing that can be a hazard to birds and wildlife or restricts access of some species of wildlife to riparian-wetland habitats would result in long-term beneficial impacts to wildlife. Using a natural healing approach could require a longer time period to achieve riparian/wetland improvement than using projects but the healing time would depend on how quickly changes in management occur. Alternative B road closures and subsequent reclamation would beneficially impact wildlife by improving habitat and water quality. Closure and reclamation of unnecessary roads could reduce fragmentation and restore habitat integrity, while reducing the potential for wildlife disturbance.

Fish and Special Status Species

Alternative B prohibits new BLM projects that would result in the removal or depletion of water from fish-bearing streams, and would remove existing projects that affect sustainability of populations of fish species. Alternative B also requires surveys and subsequent mitigation, if required, for all BLM Sensitive Species in a project area before authorizing surface-disturbing and disruptive activities. Protection measures implemented for Sensitive Species would likely result in beneficial impacts to wildlife using the same area. For both of these management actions, Alternative B would result in greater beneficial impacts to wildlife than Alternative A, which implement the actions only on a case-by-case basis.

Alternative B prohibits livestock water development projects in greater sage-grouse nesting areas, which would prevent heavy grazing utilization and make more vegetation available to wildlife in those areas. Alternative B prohibits surface-disturbing and disruptive activities within 0.6 mile of occupied or undetermined greater sage-grouse leks, which also protects habitat for other wildlife utilizing the same area. Alternative B protects 93,410 acres of habitat on public surface lands over the long term, which represents an almost 600 percent increase in habitat protected over Alternative A. Alternative B avoids surface-disturbing and disruptive activities from February 1 to July 31 within 3 miles of occupied greater sage-grouse leks, equating to approximately 1,339,609 acres of public surface lands. This seasonal protection would have a beneficial impact on many other species of sagebrush-obligate neotropical migrants nesting in these habitats. Alternative B protects 69 percent more acres of nesting habitat (794,452 acres) in the short term than Alternative A. Alternative B closes the designated greater sage-grouse Core Area to oil and gas leasing, which would beneficially impact other wildlife species by eliminating habitat loss and animal disturbance/displacement from development and operations activities. Overall, Alternative B would result in greater beneficial impacts to wildlife from the larger buffer areas and the closure of the greater sage-grouse Core Area to oil and gas leasing than Alternative A.

Wild Horses

Alternative B wild horse management would result in direct beneficial impacts to big game, game birds, raptors, and neotropical migrants because fences would be removed or modified to facilitate free movement among wild horse herds. Removing fences would reduce hazards to big game animals and birds. Modifying fences to allow wild horse movement would facilitate big game movement that might otherwise be limited or restricted. Establishing viewing loops for wild horses would result in displacement of wildlife using areas adjacent to the loop road from vehicle use and human presence, but wildlife should return once vehicles have left the area.

Cultural and Paleontological Resources

The area of protection surrounding cultural and paleontological resources increases under Alternative B, which would increase the amount of wildlife habitat protected near these sites. Alternative B would pursue locatable mineral withdrawals for the Warm Springs Canyon Flume and fossil areas in the Beaver Rim and Bison Basin proposed NNLs preventing the alteration or loss of wildlife habitat. In addition, these same areas would be subject to an NSO restriction for mineral leasing. Alternative B would result in greater beneficial impacts to wildlife than Alternative A because Alternative B protects more acres from mineral exploration and development that would result in habitat loss and fragmentation.

4.4.6.3.3.3. Resource Uses

Minerals

Alternative B allows locatable mineral entry on 954,776 acres of public surface (40 percent) in the planning area. Impacts to wildlife from exploration and development activity would be the same as Alternative A, but could occur on approximately 59 percent fewer acres of habitat. Alternative B makes available 237,264 acres of crucial winter range and parturition habitat open to exploration and development. In addition to the withdrawals under Alternative A, Alternative B pursues an additional 1,609,491 acres of federal surface and subsurface for withdrawal. Withdrawals would be for lands primarily in designated ACECs, of which 782,105 acres are big game crucial winter range and parturition habitat. Alternative B would result in greater beneficial impacts to wildlife than Alternative A, because Alternative B would withdraw more land from exploration and development, which would result in less habitat loss, fragmentation, and wildlife disruption.

Alternative B opens a total of 816,619 public surface acres (34 percent) in the planning area to geothermal leasing and opens 529,576 acres (22 percent) of public surface to oil and gas leasing. Impacts of exploration and development activities under Alternative B would be the same as under Alternative A, but would occur on approximately 60 percent fewer acres of wildlife habitat than under Alternative A. It is anticipated that approximately 536 acres would be disturbed each year under Alternative B through oil and gas development activities, with 274 acres being disturbed yearly over the long term. Alternative B would disturb approximately 23 percent fewer acres than Alternative A, resulting in fewer adverse impacts to wildlife and their habitats. Alternative B manages exploration and development in portions of crucial winter range and parturition habitat with a TLS. Alternative B opens the fewest acres to mineral leasing and potential future development, resulting in the least amount of habitat and habitat connectivity loss and fragmentation; this would result in the greatest beneficial impacts to wildlife.

Alternative B does not apply an MLP; instead, lands with resource conflicts are closed to oil and gas leasing. This is more beneficial to wildlife than Alternative A which does not have a method for resolving conflicts prior to leasing.

Alternative B extends seasonal protections for big game crucial winter range, elk winter range, and raptor nesting, and seasonal protections for special status species (greater sage-grouse and mountain plover) to the O&M activities for developed projects if the activities would be detrimental to wildlife. Activities such as hydraulic fracturing ("fracking"), powerline reconstruction, and range improvement and road maintenance are subject to timing limitations to protect wildlife. These types of activities can stress and disturb wildlife during the sensitive winter and nesting periods due to the time it takes to complete the work, the level of noise generated, and the presence of people and equipment. It is expected that project O&M activities would result in both short-term adverse impacts related to animal displacement and long-term adverse impacts if the level of activity results in area avoidance or loss of nests or young. Alternative B would result in greater short-term beneficial impacts to wildlife than Alternative A.

Under Alternative B, areas closed to leasing or subject to major constraints are closed to geophysical activities and areas open are subject to stipulations for surface-disturbing activities, disruptive activities, and vehicle travel for the area. Closing areas would provide long-term protection from the adverse impacts of cross-country motorized travel, vegetation crushing with possible plant mortality, and wildlife displacement. Restricting geophysical activities during sensitive times such as breeding, nesting, and winter periods would prevent abandonment or loss of nests or young, providing short-term beneficial impacts to wildlife.

Alternative B opens a total of 464,859 acres (19 percent) of the planning area to phosphate leasing, of which 2,699 acres are in areas having identified potential for phosphate. In areas with potential, Alternative B opens 488 acres of crucial winter range and 836 acres of raptor nesting habitat to leasing, which, if developed, would adversely impact wildlife. Closed lands are primarily in the existing and proposed ACECs, which encompass sensitive wildlife habitats such as big game crucial winter range, parturition areas, and nesting habitats. Alternative B would result in long-term beneficial impacts to wildlife because habitat would not be lost or fragmented as a result of phosphate development. Where phosphate leasing is open and development occurs, there would be adverse impacts to wildlife from the long-term, and possibly permanent, loss of habitat. Wildlife would likely avoid closed areas adjacent to open areas because of development activities and noise from phosphate mining operations. Alternative B would result in greater beneficial impacts to wildlife than Alternative A.

Alternative B opens approximately 185,266 surface acres (8 percent) of the planning area to mineral materials disposals, 79 percent fewer acres than Alternative A. Of these acres, 1,574 overlap big game crucial winter range and parturition areas and 73,165 acres are in raptor nesting habitats. Alternative B closes 2,208,943 acres to mineral materials disposal primarily in the new and existing ACECs. Closing areas in sensitive wildlife habitats would have beneficial impacts, and Alternative B would result in greater beneficial impacts than Alternative A.

Lands

Under Alternative B, 5,436 acres are available for disposal by sale, exchange, or other methods, with an additional 1,435 acres available but with restrictions on their future use. Alternative B would result in fewer adverse impacts to wildlife habitat than Alternative A because, under Alternative B, more acres remain in public ownership and subject to management that considers wildlife values. Alternative B makes approximately 67 percent fewer acres available for exchange and sale than Alternative A, which could also limit the acquisition of lands important to wildlife.

Renewable Energy

Alternative B opens 41,372 acres (2 percent) of the planning area to wind-energy development, which is 98 percent less acres than Alternative A. Alternative B closes big game winter range, parturition areas, and migration corridors, and identified raptor concentration areas to wind energy projects. This action would result in beneficial impacts to wildlife using these key habitat areas. Alternative B provides the greatest planning area-wide guidance for wind energy project locations, and would result in the fewest adverse impacts to wildlife compared to the other alternatives.

ROWs and Corridors

Alternative B opens fewer acres to ROWs (475,181 acres, or 20 percent of the planning area) and manages more acres as ROW exclusion areas (1,919,029 acres, or 80 percent of the planning area) than under Alternative A. ROW exclusion areas encompass 262,924 acres of big game crucial winter range and 27,636 acres of big game parturition habitat. Alternative B manages 315,962 acres as ROW avoidance areas. Alternative B designates three utility corridors on 15,364 acres in the planning area; corridor widths vary from 400 feet near NHTs to a minimum of 3,500 feet in Energy Corridor 79-216. Concentrating ROWs in corridors would beneficially impact wildlife by reducing the amount of new surface disturbance in undisturbed and unfragmented habitats. Alternative B would result in the fewest adverse impacts to wildlife in relation to the other alternatives.

Livestock Grazing Management

Alternative B opens approximately 2,312,095 acres (97 percent) of the planning area to livestock grazing, 12,839 fewer acres than Alternative A. This management closes lands to livestock grazing in the WGFD Spence/Moriarity WMA, Whiskey Mountain WHMA, and in Sweetwater Canyon. Because of their unique wildlife resources, these areas are priority wildlife wintering and viewing areas for elk, bighorn sheep, and moose. Closing these areas to livestock grazing would reduce competition for forage between livestock and wildlife. Lands closed in the Whiskey Mountain area are in and adjacent to bighorn sheep crucial winter range. These lands have shallow soils that produce limited vegetation, so closing lands would allow all produced vegetation to be available to bighorn sheep. Sweetwater Canyon is crucial winter range for moose and elk and supports a diversity of wildlife species from all wildlife statutory categories. Due to steep canyon walls, livestock tend to concentrate in the canyon bottom and heavily utilize the riparian-wetland grass and willow community, reducing the quality and quantity of forage and thermal cover for moose and elk. Closing the Spence/Moriarity, Whiskey Mountain, and Sweetwater Canyon lands to livestock grazing would eliminate competition for forage between livestock and big game, and result in greater long-term beneficial impacts to big game and other species of wildlife using these habitats than Alternative A.

Alternative B livestock grazing levels would not exceed light utilization on areas preferred by livestock, which often include riparian-wetland areas. Higher utilization levels, such as the moderate use allowed under Alternative A, can reduce forage and cover for wildlife and plant diversity and result in a decline in the number of wildlife species the area can support. However, some species of grassland birds prefer areas that receive higher plant utilization levels (Derner et al. 2009). Alternative B prohibits salt or mineral supplements within ½ mile of riparian-wetland habitats to aid in preventing livestock from congregating at water sources, increasing the protection by ¼ mile over Alternative A. Alternative B uses livestock grazing management strategies that do not require developing additional water or fences to maintain, enhance, or achieve rangeland health. It is assumed that new reservoirs and/or pits, wells, spring developments, or fences would not be constructed during the planning period, a reduction of 860 acres of disturbance over Alternative A. Limiting new range improvements that can impede migration and result in habitat loss, fragmentation, and displacement would beneficially impact wildlife. As opportunities arise, fences and cattleguards installed for livestock management would be removed or modified to facilitate wildlife movement under Alternative B. Alternative B would result in greater long-term beneficial impacts to wildlife than Alternative A.

Recreation and Travel Management

Alternative B proposes to withdraw 1,609,491 more acres from locatable mineral exploration than Alternative A; this would beneficially impact wildlife. This management action would protect wildlife habitat on these lands and would withdraw the most acres compared to all other alternatives. Alternative B designates more acres as SRMAs and distinct ERMAs than Alternative A. Alternative B applies special management to these designations, such as closing the areas to mineral leasing, withdrawing the areas from locatable mineral exploration and development, and excluding the areas to wind-energy development and ROWs; this would protect and maintain wildlife habitat. These actions would result in greater beneficial impacts to wildlife than Alternative A, but increased human presence from recreationists could adversely impact wildlife utilizing the SRMAs and distinct ERMAs. Increased human activity in these areas is expected to occur outside the winter months when wildlife are less likely to be present in large numbers/groups. Closing recreation areas to motorized vehicle use would beneficially impact wildlife by minimizing noise and reducing or eliminating habitat loss and fragmentation from road and trail use.

Alternative B increases restrictions on motorized vehicle use; it closes 57,456 more acres to motorized and mechanized travel than Alternative A. Closing areas would prevent additional habitat loss and fragmentation resulting from road use. Roads and trails in closure areas would rehabilitate over time, returning disturbed roadbeds to usable habitat. Alternative B changes 37,989 acres limited to motorized travel on existing roads and trails to limited to designated roads and trails. Increasing the number of acres where specific roads can be designated increases the protection of wildlife habitat by directing road travel away from sensitive habitats such as winter range, parturition area, and nesting habitat. Closing or decreasing the number of roads and trails available to hunters by impact the ability to achieve or maintain wildlife population objectives set by the WGFD. Alternative B includes seasonal closures on 5,803 more acres of wildlife habitat than Alternative A, which would result in greater long-term beneficial impacts to wintering and birthing wildlife than Alternative A.

4.4.6.3.3.4. Special Designations

Alternative B designates 15 ACECs totaling 1,492,990 acres (62 percent) of public land in the planning area. The types of beneficial impacts to wildlife would be similar to Alternative A, but these impacts would apply to 1,373,368 more acres, roughly 12 times the number of acres designated under Alternative A. Alternative B manages ACECs with the most restrictive mineral and realty prescriptions, which would protect wildlife habitat from loss or fragmentation over the long term. This management would result in direct beneficial impacts to wildlife and their associated habitats by (1) closing lands to mineral leasing, (2) pursuing locatable mineral entry withdrawals, (3) closing or limiting areas to motorized vehicle use, (4) excluding major utility systems, ROWs, and wind-energy development, and (5) prohibiting other surface-disturbing activities not compatible with retaining or enhancing the areas' values. Beneficial impacts to wildlife from management actions for the Whiskey Mountain, Lander Slope, Red Canyon, and Dubois Badlands ACECs would increase under Alternative B compared to Alternative A. In addition, Alternative B closes the Whiskey Mountain ACEC to livestock grazing, which would eliminate the competition for forage on bighorn sheep winter range. Alternative B closes the Lander Slope, Red Canyon, and Dubois Badlands areas to mineral leasing and withdraws the areas from locatable mineral exploration and development; this would provide greater protection of wildlife habitat from surface-disturbing activities than Alternative A. Alternative B expands the size of the East Fork, Green Mountain, Beaver Rim, South Pass Mining Area, and NHTs ACECs, increasing the acres of wildlife habitat protected from surface-disturbing activities over Alternative A. Alternative B specifically expands the Green Mountain and East Fork ACECs to protect more elk crucial winter range and parturition habitat.

Alternative B designates six additional ACECs in addition to the nine ACECs designated under Alternative A that overlap big game crucial winter range, nesting habitat for all bird species, and habitat for wildlife species in each statutory category. These lands would be closed to mineral leasing and withdrawn from locatable mineral exploration and developments which would protect wildlife occupying the area. Management actions that preclude new surface disturbance would protect seasonal habitats, movement corridors, and connectivity habitats from loss, fragmentation, and modification, which would result in long-term beneficial impacts to all wildlife species. Of the six new ACECs, the Government Draw/Upper Sweetwater Sage-Grouse ACEC is designated specifically for greater sage-grouse. Management that protects the sagebrush ecosystem and riparian-wetland habitats would have beneficial impacts for other wildlife species, particularly sagebrush-obligate species.

There would be long-term beneficial impacts to wildlife that use habitats in ACECs because management actions would protect habitats year-round versus the seasonal protections that come with standard stipulations. This would be especially beneficial to big game winter range because management would prevent habitat disturbance and loss that can occur outside the winter period.

Under Alternative B, the area of surface protection increases from ¼ mile to 5 miles either side of NHTs, unless the project would not visible from the trails; therefore, Alternative B would protect more acres of wildlife habitat from loss or fragmentation than Alternative A. This action would result in long-term beneficial impacts to wildlife. Alternative B's management of the expanded Green Mountain ACEC is more beneficial to wildlife because all of the elk parturition areas are closed to oil and gas leasing and withdrawn from locatable mineral entry. The area has both uranium and oil and gas potential so the beneficial impacts could be considerable in comparison to Alternative A.

Overall, Alternative B management prescriptions would result in long-term beneficial impacts to wildlife on a larger part of the planning area than Alternative A. These beneficial impacts would likely also be seen on the adjacent non-federal lands in the Whiskey Mountain, East Fork, Lander Slope, and Red Canyon areas due to the management of adjacent lands and the number of land conservation agreements in place.

Alternative B recommends NWSRS-eligible waterway segments as suitable for inclusion in the NWSRS, closes lands within ¼ mile of those waterways to mineral and realty actions, and recommends they be withdrawn from locatable mineral entry. Alternative B also closes these areas to motorized and mechanized travel and activities that change the character of the waterway and the adjacent area. This management would reduce or eliminate habitat loss and fragmentation, which would result in long-term beneficial impacts to wildlife. Alternative B increases the level of protection for surface-disturbing activities, and would result in greater beneficial impacts to wildlife than Alternative A.

4.4.6.3.4. Alternative C

4.4.6.3.4.1. Program Management

Alternative C does not require that the footprint of surfacing-disturbing activities and facilities be reduced to minimize the impacts of wildlife habitat loss and fragmentation. Not reducing the footprint could lead to greater amounts of unnecessary habitat loss than Alternative B and somewhat more than Alternative A. Alternative C does not avoid reptile hibernacula, which would result in the same impacts as Alternative A and greater adverse impacts than Alternative B, which avoids surface disturbance within 1,000 feet of den sites.

Alternative C manages wind-energy development consistent with the Wind Energy Programmatic EIS ROD (BLM 2005a), and does not specifically exclude big game crucial winter range and parturition areas, raptor concentration areas, and habitats within 3 miles of greater sage-grouse leks from wind-energy development. Alternative C would result in adverse impacts to wildlife the same as Alternative A and greater than Alternative B, because Alternative C makes more area available for surface-disturbing and disruptive activities related to wind-energy development.

Alternative C does not apply a TLS for surface-disturbing and disruptive activities in elk winter range (166,525 acres). Alternative C would result in more adverse impacts to wintering elk on non-crucial winter range than alternatives A and B. The Alternative C TLS buffer for active raptor nests is ½ mile and nesting dates are specific to each raptor species. Alternative C protects less raptor nesting habitat (158,199 acres) during the nesting period than Alternative A (301,237 acres) or Alternative B (781,643 acres). A ½-mile protective buffer would not be adequate to protect raptor species that are more sensitive to disturbance, and disturbance could cause the raptor to abandon the nest or chicks. Like Alternative B, Alternative C would specify nesting dates by raptor species would likely shorten the timing restriction period for surface-disturbing and disruptive activities compared to the Alternative A timeframe, which encompasses all nesting dates for raptor species.

Like Alternative A, Alternative C does not manage any areas with MLP protections and so it has the potential for more adverse impacts to wildlife than Alternative D, which applies an MLP in the Beaver Rim area, and Alternative B, which closes the Beaver Rim area to oil and gas leasing.

Alternative C allows new road development in big game crucial winter range and parturition habitat except in areas closed to surface-disturbing activities. Roads identified as redundant would not be closed or reclaimed. These actions could increase or maintain road densities in sensitive habitats and increase habitat fragmentation. Alternative C allows new fences in the planning area and the miles of fence would steadily accumulate. Existing fences would be removed or modified on a case-by-case basis to address habitat fragmentation and impediments to big game movement in migration corridors. Alternative C allows livestock water development projects in big game crucial winter range and parturition areas, which could impact the availability of forage and increase habitat disturbance to wildlife. Alternative C would result in more adverse impacts to wildlife than Alternative B and about the same as Alternative A.

Management under Alternative C gives priority to livestock forage needs when allocating vegetation resources in the planning area. Vegetation on big game crucial winter range or parturition areas is not managed specifically to benefit big game, but managed instead to benefit all grazing and browsing animals (livestock, wild horses, and wildlife). In habitats where forage is limited or over allocated, this would adversely impact wildlife because adequate forage might not be available on a consistent basis. Alternative C would have an increased potential for adverse impacts to wildlife than alternatives A and B.

4.4.6.3.4.2. Resources

Lands with Wilderness Characteristics

Alternative C manages lands with wilderness characteristics in the Little Red Creek Complex for multiple use, which would increase the risk of adverse impacts to wildlife habitat as a result of the area being open to surface-disturbing activities. Increased human presence in the area from authorized activities would result in short-term wildlife displacement, with the degree of disturbance depending on the extent and timing of the activity. Alternative C does not designate the Whiskey Mountain ACEC; therefore, protections afforded under alternatives A and B would not apply. Alternative C limits motorized travel to existing roads and trails, which would result in impacts similar to Alternative A and more adverse than under Alternative B. Because Alternative B designates only a small area (5,490 acres) as non-WSA lands with wilderness characteristics to protect the area's wilderness character, the adverse impacts under Alternative C from not specially managing these areas would not be substantially greater.

Fire and Fuels

Under Alternative C, approximately 300 acres per year would be treated by prescribed fire and 500 acres per year would be treated using mechanical methods. Alternative C would result in impacts the same as Alternative A, and decreases the use of prescribed fire over Alternative B. Alternative C allows full suppression to address wildland fire across the planning area, including the use of heavy equipment. Alternative C impacts to wildlife would be the same as impacts under Alternative A. Full suppression could adversely impact wildlife in sagebrush-grass ecosystems that benefit from periodic fire needed to rejuvenate sagebrush and promote plant diversity, but would limit adverse impacts from landscape-level wildland fire that results in long-term habitat loss and wildlife displacement across a large landscape.

Vegetation

Impacts to wildlife from forest management actions under Alternative C would be similar to impacts under Alternative A. The full range of silviculture techniques would be used to manage forests and woodlands to improve forest health, provide forest products to the public, and address forest insect and disease outbreaks. Alternative C uses thinning and selective timber removals to maintain forest health and reduce the risks of tree mortality from insects, disease, and wildfire. Alternative C allows clear-cuts with no limitations on size, which could result in the long-term loss of adequate security cover for elk. Replanting efforts would follow timber harvest, which would beneficially impact wildlife once trees grow enough to offer hiding cover.

Under Alternative C, forest management plans would be developed for the Green Mountain, Lander Slope/Red Canyon, South Pass, and Dubois areas to address forest health, product sales, and commercial timber production. These are important areas to many species of wildlife, in particular, big game. Managing for forest health and limited forest product sales would beneficially impact wildlife by maintaining intact healthy habitats. Large-scale commercial sales would adversely impact wildlife in the short term through disturbances from noise and human presence, and the potential loss of soil and degraded water quality. Animal displacement from the affected area and habitat loss or alteration would adversely impact wildlife in the long term.

Alternative C manages grasslands and shrublands to maximize forage production on the ecological site, as described in the NRCS Ecological Site Descriptions. In most areas this action would result in an increase in the amount of herbaceous vegetation present in the plant community and a decrease in the amount of shrubs. Treatments focused on increasing grass plant production would result in beneficial impacts to wildlife grazers such as elk and bighorn sheep, and could adversely impact wildlife browsers such as pronghorn, mule deer, and moose. In addition, neotropical migrants, nongame mammals, predatory animals, and some game birds would experience beneficial impacts from increased habitat, while shrub-obligate species, including small game, game birds, trophy game, reptiles, and neotropical migrants, would likely experience adverse impacts from loss of habitat. Most wildlife species present in the planning area are sagebrush/grass obligates; a few species are grassland obligates. Beneficial impacts to wildlife would be expected to be lower under Alternative C than under alternatives A and B, because the action would be likely to manage for more grass and fewer shrubs, which can adversely impact a larger number of wildlife species.

The Alternative C management to prohibit surface-disturbing activities within 500 feet of riparian-wetland areas is same as management under Alternative A, except that Alternative C allows a smaller distance if it can be shown that riparian-wetland area protection could still be achieved. Under Alternative C, more acres of wildlife habitat adjacent to riparian-wetland areas could be disturbed than under Alternative A and substantially more acres than under Alternative B.

Similar to Alternative A, Alternative C management to improve riparian-wetland areas toward PFC would consist of all available techniques; however, Alternative C likely would utilize more livestock control fences and water developments to achieve improvement than Alternative A. As described under Alternative A, additional fencing and water developments can result in both adverse and beneficial impacts to wildlife. Because fences can be hazardous to wildlife movement, Alternative C would result in the greatest risk for adverse impacts to wildlife. Compared to the other alternatives, Alternative C would result in the greatest risk to wildlife from new fencing and water developments.

Fish and Special Status Species

Impacts to fish and special status species under Alternative C would be the same as impacts under Alternative A, and Alternative C management of fish and special status species is much less restrictive than Alternative B. Required surveys and subsequent mitigation for sensitive species, actions that remove or deplete water from fish-bearing streams, and the development of livestock water projects in greater sage-grouse nesting habitat are all authorized on a case-by-case basis. Alternative C management of the greater sage-grouse Core Area and the size of greater sage-grouse lek and nesting protection buffers is the same as Alternative A, and much less restrictive than management under Alternative B; therefore, Alternative C would provide fewer habitat and seasonal protections than Alternative B.

Wild Horses

Alternative C considers impacts to wild horse movement from new fences in HMAs, but existing fences would not be specifically removed or modified to facilitate wild horse movement. Adverse impacts to wildlife from wild horse management actions under Alternative C would be the same as impacts under Alternative A and greater than under Alternative B, which removes fences. Alternative C establishes wild horse viewing loops and impacts would be the same as under Alternative B.

Cultural and Paleontological Resources

Alternative C would result in beneficial impacts to wildlife from cultural and paleontological resources protection the same as Alternative A and less than Alternative B. Compared to all other alternatives, Alternative B protects the largest number of acres and increases the level of protection for cultural and paleontological resources.

4.4.6.3.4.3. Resource Uses

Minerals

Alternative C opens 2,385,576 acres (99 percent) of BLM-administered surface to locatable mineral exploration and development, which could occur on almost the same amount of wildlife habitat as Alternative A and 40 percent more acres of wildlife habitat than Alternative B. Alternative C does not withdraw additional acres; however, pre-FLPMA withdrawals would remain and therefore close exploration and development in those areas. Alternative C allows existing withdrawals in bighorn sheep and elk crucial winter range in the Whiskey Mountain and East Fork areas to expire. Allowing locatable mineral exploration and development in crucial winter range and parturition areas would adversely impact big game herds through loss of limited and sensitive habitat. Alternative C would result in more adverse impacts to wildlife than Alternative B, and slightly more adverse impacts than Alternative A.

Impacts from geothermal and oil and gas leasing under Alternative C would be similar to impacts under Alternative A. Alternative C opens a total of 2,295,114 public surface acres (96 percent) to geothermal leasing and 2,394,132 acres (more than 99 percent of the planning area) to oil and gas leasing. Alternative C closes 99,096 acres to geothermal leasing and 78 acres to oil and gas leasing. Alternative C would result in more adverse impacts to wildlife because more acres would be available for development, resulting in a greater potential for larger losses of habitat, increased habitat fragmentation, and increased disturbances from noise and human presence. It is anticipated that approximately 774 acres would be disturbed each year under Alternative C, 402 of those acres being disturbed over the long term. Alternative C would result in almost the same acres of disturbance as Alternative A and would disturb approximately 31 percent more acres than Alternative B. Alternative B opens the fewest number of acres to mineral leasing and potential future development; this would result in the least amount of habitat and habitat connectivity loss and fragmentation and therefore greater beneficial impacts to wildlife. Overall, Alternative C would result in more adverse impacts to wildlife than Alternative B which could lead to population declines, and almost the same impacts as Alternative A, including in the Beaver Rim area and the proposed expanded Green Mountain ACEC.

Alternative C does not apply seasonal protections for big game crucial winter range, elk winter range, and raptor nesting habitat, or seasonal protections for special status species (greater sage-grouse and mountain plover) to O&M activities for developed projects. Alternative C adverse impacts to wildlife from allowing disruptive activities during sensitive periods would be the same as impacts under Alternative A and greater than impacts under Alternative B.

Alternative C impacts from geophysical exploration activities would be the same as impacts under Alternative A. Alternative C would result in more adverse impacts to wildlife than Alternative B because Alternative C opens more acres to geophysical activities that can adversely impact habitats and cause nest abandonment or chick/young mortality.

Alternative C opens a total of 2,272,359 public surface acres (95 percent) to phosphate leasing. In areas with phosphate potential, Alternative C opens 24,860 acres of crucial winter range and 1,367 acres of raptor nesting habitat to leasing, which would result in adverse impacts if the phosphate resource was developed. Alternative C opens 95 percent of the acres with phosphate potential to leasing and development, slightly more acres than Alternative A and 15 times more acres than Alternative B. Alternative C impacts to wildlife from phosphate leasing and development would be similar to impacts under Alternative A, except that Alternative C opens the Red Canyon area to leasing and does not include limitations on phosphate development on the Lander Slope. The Red Canyon area supports a large number of wintering elk and mule deer, and the loss of this habitat from phosphate development would result in long-term adverse impacts to big game herds that depend on the area. It is expected that elk and mule deer populations would decline in this area under Alternative C.

Alternative C opens 2,252,801 surface acres in the planning area to mineral materials disposal. Of these acres, 564,320 overlap big game crucial winter range and parturition habitat and 149,960 acres are in raptor nesting habitats. Alternative C closes approximately 141,409 surface acres to mineral materials disposals, primarily in riparian-wetland areas, around greater sage-grouse leks, and in pre-FLPMA withdrawal areas. Closing areas in sensitive wildlife habitats would beneficially impact wildlife by protecting habitats from surface-disturbing activities. Alternative C allows surface disturbance on more acres than alternatives A and B, and therefore would result in the greatest potential for long-term adverse impacts to wildlife.

Lands

Under Alternative C, 5,436 acres are available for disposal by sale, exchange, or other methods, with an additional 1,435 acres available but restricted. Alternative C impacts to wildlife from land tenure adjustments would be the same as impacts under Alternative B and less than impacts under Alternative A. Alternatives B and C retain the most acres in public ownership and subject to management that considers wildlife values when making land use decisions.

Renewable Energy

Alternative C opens 2,284,235 acres (95 percent of the planning area) to wind-energy development. Impacts to wildlife from wind energy project locations and turbines in the planning area would be the same as impacts under Alternative A. Alternatives A and C allow for construction in sensitive or limited habitats for wildlife, which would result in more adverse impacts than Alternative B, which closes these habitats to development.

ROWs and Corridors

Alternative C opens 2,247,157 acres (94 percent of the planning area) to ROWs, more than all the other alternatives. Alternative C designates 660,908 acres across the planning area as ROW corridors with widths up to 3 miles, except in the Dubois area. Alternative C excludes

ROWs on 147,053 acres, with most of the exclusion acres being primarily along NHTs and in the Sweetwater Rocks. Alternative C avoids ROWs and corridors on another 11,714 acres. Alternative C opens more acres to ROWs and corridors than the other alternatives, and would result in the greatest potential for adverse impacts to wildlife.

Livestock Grazing Management

Alternative C opens the same areas to livestock grazing as Alternative A, and 12,839 more acres than Alternative B. Alternative C opens public lands in the Spence/Moriarity WMA to livestock grazing. These lands are isolated, unfenced, lack available water, and have limited to no vehicle access. Allotment boundary fencing, water developments, and access roads would be necessary to prevent livestock trespass on adjacent WGFD lands. Authorized grazing would result in a reduction of forage needed to support the large concentrations of elk and bighorn sheep that winter on the lands, and required grazing infrastructure would result in hazards to movement and habitat fragmentation.

Under Alternative C, the BLM would utilize all livestock grazing management strategies, including the increased use of infrastructure, to maintain, enhance, or achieve rangeland health. Livestock management actions would disturb approximately 100 acres each year during construction and/or development of range improvements, including reservoirs and pits, fences, pipelines, and spring developments. It is assumed that approximately two reservoirs and pits, six wells, four spring developments, and 49 miles of fence would be constructed each year during the planning period. An increase in the amount of fencing in the planning area would increase habitat fragmentation for many species of wildlife and increase the number of hazards to movement. Developing more water developments to address livestock distribution concerns would alter the way wildlife utilize the habitat. Range improvements under Alternative C would result in greater loss and fragmentation of wildlife habitats than alternatives A and B. Alternative C allows higher livestock utilization levels than Alternative B, which would increase the potential for livestock and big game to compete for forage. Increasing water development could benefit wildlife in very arid parts of the planning area. Alternative C prohibits salt or mineral supplements within ¼ mile of riparian-wetland areas, but allows the placement of salt or mineral supplements in all other habitats to maximize range utilization. Increasing livestock grazing use in sensitive wildlife habitats would likely result in wildlife displacement, increased competition for forage, and loss of habitat around supplement locations. Fences and cattleguards would be modified or removed to facilitate livestock movement and management, which might not provide any beneficial impact to wildlife movement. Alternative C would result in more adverse impacts to wildlife than alternatives A and B.

Recreation and Travel Management

Alternative C does not withdraw lands around developed recreation sites, campgrounds, and interpretive sites, and opens lands to locatable mineral exploration and development. Mining operations in these areas would result in habitat loss. The Dubois Mill Site is the only SRMA Alternative C recognizes and it is closed to motorized travel. Similar to Alternative A, Alternative C manages the other recreation management areas as ERMAs and opens them to motorized travel. Alternative C would result in more adverse impacts to wildlife than alternatives A and B, which include more restrictive management of developed recreation sites, campgrounds, and interpretive sites.

Alternative C restricts motorized vehicle use on fewer acres than alternatives A and B. Alternative C limits motorized travel to the less restrictive existing roads and trails in 98 percent of the planning area, 5 percent more of the planning area than Alternative A and 10 more of the planning area than Alternative B. Opening all existing roads and trails to motorized vehicle travel would increase the amount of habitat lost, fragmented, and/or avoided by wildlife. Alternative C designates which roads and trails are open to travel on 50,776 acres, 112,299 fewer acres than Alternative A and 142,928 fewer acres than Alternative B. This could result in more impacts to wildlife because less area would use designated roads and trails as a way to address resource management impacts in sensitive wildlife habitat. Alternative C closes 5,472 acres to motorized travel, fewer acres than Alternative A and substantially fewer acres than Alternative B. Alternative C does not include any seasonal closures, which would result in disturbance and displacement impacts to wintering wildlife in areas closed under alternatives A and B (primarily big game crucial winter range and parturition habitat). Alternative C would result in adverse impacts to wildlife through habitat loss, fragmentation, and avoidance in a greater percentage of the planning area than alternatives A and B.

4.4.6.3.4.4. Special Designations

Alternative C does not designate ACECs and manages areas designated under other alternatives using standard stipulations. A TLS for surface-disturbing activities on crucial winter range and near raptor nesting sites would result in short-term beneficial impacts. Plans of Operation for locatable mineral activities on lands under Alternative A are not required under Alternative C, which could result in long-term habitat loss and fragmentation in sensitive wildlife habitats if exploration occurs. Alternative C allows surface-disturbing activities on crucial winter range during non-winter months, depending on the type and size of permitted actions, which would result in the loss or fragmentation of habitat. Crucial winter range in the Dubois, Red Canyon, and Lander Slope areas is limited due to high-elevation snows, the availability of exposed forage, and the urbanization of surrounding lands, therefore wintering elk and bighorn sheep depend on lower-elevation public lands extensively.

Disturbed habitats would not be available when animals are highly dependent on them to provide winter forage and cover. Healthy, intact, and available winter range is critical for the survival of wildlife during the most stressful period of the year, as starvation and exposure to extreme weather can result in animal mortality. Under Alternative C, surface-disturbing activities would result in the loss and fragmentation of habitat essential for these species and could result in population declines, an increase in depredation of adjacent private or state lands, and forage conflicts with livestock.

Alternative C would allow locatable mineral withdrawals in the Whiskey Mountain and East Fork areas that are subject to expiration to expire and would not pursue withdrawal extensions. After existing withdrawals expire in the Whiskey Mountain and East Fork areas between 2010 and 2020, Alternative C opens those areas to locatable mineral exploration and development. A withdrawal for approximately 9,600 acres in the Whiskey Mountain area is set to expire in 2010 and an extension is currently being pursued. If the withdrawal becomes final, these acres would be withdrawn for much of planning period. At the point the withdrawal would expire in another 20 years, an extension would not be pursued.

Surface facilities or habitat modifications that prevent or interfere with wintering animals reaching escape habitat could lead to increased mortality from predators. Bighorn sheep are not tolerant of human activities and animals utilizing these winter habitats would avoid the area, which could result in population declines. Reducing opportunities to hunt and view bighorn sheep would result in adverse impacts to recreation opportunities and to local economies that depend on hunting and tourism revenue. Allowing surface-disturbing activities or facilities in the Whiskey Mountain and East Fork areas would adversely impact wildlife by promoting habitat loss and fragmentation on crucial winter range, which would like threaten the long-term viability of the herds.

Under Alternative C, forage in the Whiskey Mountain and East Fork areas would be available for all grazing animals with no preference for wildlife needs. Forage competition can lead to poor animal fitness and low reproductive rates and high utilization of habitats can result in less productive rangelands and long-term habitat loss for wildlife. Alternative C would result in adverse impacts to wildlife from management that opens the Whiskey Mountain and East Fork areas to livestock grazing, compared to the beneficial impacts under alternatives A and B.

Alternative C opens the Green Mountain and Beaver Rim areas to energy development, including wind energy and does not require an MLP. The area has high potential for wind-energy development and surface disturbance from development would result in long-term loss of habitat. If wind energy projects were established, the area would likely be unsuitable for wintering elk due to adverse impacts from turbine, road, and powerline infrastructure, and noise and human presence. The area also has high potential for uranium and Alternative C would allow exploration activities without the benefit of the project proponent completing a Plan of Operations. Exploration activities could lead to elk crucial winter range habitat loss and/or fragmentation. Alternative C would result in more adverse impacts to wildlife than alternatives A and B.

Alternative C allows surface-disturbing activities, including the placement of surface facilities, and disruptive activities along Beaver Rim. This would adversely impact raptors by reducing available habitat for prey species, creating hazards around nest and perch sites, and allowing human presence or noise that could cause birds to abandon nests or young. There could be long-term adverse impacts from a reduction in available nesting habitat or a reduction in nesting success.

The WGFD owns land in the Whiskey Mountain, East Fork, and Red Canyon areas to provide crucial winter range, primarily for bighorn sheep, elk, and mule deer. The WGFD purchased much of this land because big game crucial winter range was given priority when managing the surrounding public lands. Alternative C could reduce the value of surrounding WGFD lands if public lands are developed.

Overall, Alternative C would result in the greatest potential for habitat loss and fragmentation, the greatest potential to impair connectivity between seasonal habitats, the least amount of habitat protection for big game winter ranges, and the greatest disturbance to wintering wildlife of all the alternatives.

Alternative C recognizes lands within ¼ mile of NHTs and the CDNST as part of the NLCS landscape and limits management that restricts development to Classes I and II trail segments of the NHTs. Alternative C would result in fewer beneficial impacts to wildlife along NHTs than alternatives A and B, and almost the same beneficial impacts along the CDNST as Alternative A.

Alternative C does not recommend NWSRS-eligible waterway segments as suitable for inclusion in the NWSRS and does not manage those segments specifically to preserve their suitability. Alternative C manages the Sweetwater River Unit and associated wildlife habitat under the WSA IMP, which is the same as Alternative A and less protective than Alternative B. Alternative C manages the Baldwin Creek Unit using standard stipulations that are less protective than Alternative A (ACEC prescriptions) or Alternative B, and would result in the greatest potential for adverse impacts to wildlife species. Overall, Alternative B prescribes the highest level of protection and therefore would result in the most beneficial impacts to wildlife.

4.4.6.3.5. Alternative D

4.4.6.3.5.1. Program Management

Alternative D requires that surfacing-disturbing activities and facilities be minimized to the smallest footprint practical to minimize the impact to wildlife from habitat loss and fragmentation, except when safety and maintenance issues require a larger footprint. Alternative D management is similar to Alternative B, except that Alternative D allows a larger footprint when needed based on site-specific issues. Alternative D results in greater beneficial impacts to wildlife than alternatives A and C. Alternative D prohibits surface-disturbing activities within 200 feet of identified reptile hibernacula sites, less distance than Alternative B but more than alternatives A and C, which do not afford protection of hibernacula sites.

Alternative D establishes DDAs in the Shoshoni-Lysite area, the Gas Hills, and in the Beaver Creek area to focus on energy development. Surface use and TLSs to protect wildlife and special status wildlife would be applied at the leasing stage but exceptions would be frequently authorized to exempt crucial winter range protection to facilitate development. Exceptions would not be routinely authorized for protections for special status species. Granting exceptions for crucial winter range would adversely impact big game using the areas, but due to the level of development activity that occurs in the DDAs, these areas are not considered optimum habitat.

Alternative D applies an MLP to the Beaver Rim area. The parturition area south of the Green Mountain ACEC is closed to oil and gas leasing to protect the important elk calving area.

Alternative D allows wind-energy development in big game crucial winter range, parturition habitat, migration corridors, and raptor concentration areas on a case-by-case basis. Adverse impacts under Alternative D would be the same as under alternatives A and C and greater than under Alternative B, which closes these habitats to wind-energy development.

Alternative D applies a TLS for surface-disturbing and disruptive activities in identified winter and crucial winter range for elk. Alternative D would result in impacts the same as alternatives A and B and more beneficial impacts than Alternative C, which applies a TLS only to elk crucial winter range. Alternative D (as well as alternatives A and B) protects 166,525 more acres of elk winter range than Alternative C.

Alternative D applies a TLS to surface-disturbing and disruptive activities within ¾ mile of active nests for all raptor species, except ferruginous hawk, for which Alternative D protects the area within 1 mile of nests. Ferruginous hawks are more sensitive to disturbance and require a larger buffer to protect egg incubation, hatching, and chick fledging processes. The protected period is February 1 through July 31 for raptor species other than northern goshawk and burrowing owl. Surface-disturbing and disruptive activities are prohibited from April 1 to August 31 for northern goshawk and April 1 to September 15 for burrowing owl. See the *Special Status Species – Wildlife* section for more discussion on ferruginous hawks, northern goshawks, and burrowing owl. The protection distance and/or period for nests can be adjusted based on site-specific and species-specific information. Alternative D uses a larger buffer and/or more specific nesting dates, and therefore would result in greater beneficial impacts to raptors than alternatives A and C. Alternative B would result in greater beneficial impacts than Alternative D for the same reasons.

Alternative D does not allow new fence construction in identified big game migration corridors unless a fence is identified as critical to the success of a comprehensive grazing management plan. It is unknown where and how much fence would be constructed in migration corridors under Alternative D. Existing fences would be removed in identified corridors as opportunities arise, with the goal of no net gain of fence. Within big game migration corridors, Alternative D would result in fewer adverse impacts than alternatives A and C, and slightly more adverse impacts than Alternative B. Outside of migration corridors, existing fences would also be modified or removed, on a case-by-case basis, to address habitat fragmentation and movement concerns. This action would result in the same impact outside big game migration corridors as alternatives A and C, and a less beneficial impact than Alternative B.

To prevent habitat loss and/or modification, Alternative D, on a case-by-case basis and in cooperation with adjacent landowners and/or state and county governments, avoids authorizing new road development in big game crucial winter range and parturition habitat and closes and reclaims redundant roads to reduce road density and wildlife habitat fragmentation. These actions would result in impacts the same as Alternative A, greater beneficial impacts than Alternative C, and fewer beneficial impacts than Alternative B. In these same sensitive habitats, Alternative D allows livestock water development projects in big game crucial winter range and parturition areas only if the projects are critical to the success of a comprehensive grazing management plan and impacts to habitat can be mitigated. While improving range health would be a benefit, water development projects would likely increase forage harvest, therefore Alternative D would result in greater beneficial impacts than alternatives A and C, and slightly fewer beneficial impacts than Alternative B.

Alternative D considers forage requirements to meet big game herd objectives when making forage allocations in the planning area to ensure adequate forage is available for wildlife. Alternative D would result in slightly greater beneficial impacts than Alternative A, much greater beneficial impacts than Alternative C, and fewer beneficial impacts than Alternative B. On a case-by-case basis, Alternative D manages vegetation on crucial winter range or parturition areas to benefit the species that requires the range. This action, when undertaken, would result in the same impacts to wildlife and wildlife habitat as Alternative A, less beneficial impacts than Alternative B and more beneficial impacts than Alternative C.

4.4.6.3.5.2. Resources

Lands with Wilderness Characteristics

Alternative D manages 4,954 acres of lands with wilderness characteristics as non-WSA lands with wilderness characteristics, slightly fewer acres than Alternative B. Alternative D closes non-WSA lands with wilderness characteristics to motorized travel and limits mechanized travel to designated routes, which would beneficially impact wildlife but to a lesser extent than Alternative B which prohibits both motorized and mechanized travel in the area. Alternative D would result in greater beneficial impacts to wildlife than alternatives A and C, which do not manage non-WSA lands with wilderness characteristics and allow motorized travel on all existing roads and trails in lands with wilderness characteristics. Non-WSA lands with wilderness characteristics within the Whiskey Mountain ACEC are subject to the ACEC prescriptions under Alternative D, which would beneficially impact wildlife.

Fire and Fuels

Under Alternative D, there would be approximately 500 acres of prescribed fire and 500 acres of mechanical treatment conducted each year to address rangeland fuel and fire concerns. Alternative D allows the use of prescribed fire (and the resultant risks of unintended consequences) on 200 more acres per year than alternatives A and C and 1,500 fewer acres per year than Alternative B. Alternative D management allows the full range of suppression tactics based on the resources at risk to address wildland fire, including the use of heavy equipment. This action would have beneficial impacts on wildlife because long-term adverse impacts to sensitive habitats could be prevented with the selection of the appropriate suppression tactic. Alternative D could increase the risk of adverse impacts to wildlife habitat from the use of heavy equipment in suppression efforts.

Vegetation

Alternative D manages forests and woodlands using a full range of silviculture practices in response to forest/woodland health conditions, wildlife habitat needs, and the demand for forest products. Treatment of forest insect and disease outbreaks and the implementation of forest replanting is managed on a case-by-case basis under Alternative D. Alternative D allows clear-cuts, with other resource values and silviculture objectives determining the sizes and locations of clear-cuts. This management, which is almost the same as under Alternative A, would result in both short-term adverse and long-term beneficial impacts to wildlife.

Approximately 600 acres per year of short-term disturbance are anticipated from forest and woodland management (mechanical treatments and forest product sale areas) over the planning period under Alternative D. Treatments would result in both beneficial and adverse impacts to wildlife, depending on the species and the sizes of treatment patches.

Under Alternative D, forest management plans would be developed for the Green Mountain, South Pass, and Dubois areas to address the sale of commercial and over-the-counter forest products, enhancement of forest health conditions, and the management of pine beetle infestations. Alternative D prohibits commercial forest product sales that could adversely impact the availability of wildlife habitat and increase noise and human presence in the Lander Slope and Red Canyon areas, unless the sales are needed to address human health and safety issues or improve forest health. Alternative D would result in fewer adverse impacts to wildlife habitat than alternatives A and C, and slightly fewer beneficial impacts than Alternative B.

Grasslands and shrublands are managed to achieve the vegetation attributes described in the NRCS Ecological Site Descriptions, the same management as under Alternative A. Alternative D would result in greater beneficial impacts from managing for a balance of herbaceous and woody vegetation than Alternative C, but not as much as Alternative B, which focuses on managing plant communities specifically for wildlife. Alternative D utilizes vegetative treatments to alter plant community composition to achieve rangeland health objectives. Alternative D would result in fewer adverse impacts to wildlife than Alternative C, which uses treatments to facilitate livestock grazing management that could conflict with wildlife habitat objectives. Overall, Alternative D would result in slightly fewer beneficial impacts to wildlife from grassland/shrubland management actions than Alternative B, almost the same beneficial impacts as Alternative A, and more adverse impacts than Alternative C.

Alternative D prohibits surface-disturbing activities within 500 feet of water and riparian-wetland areas outside of DDAs, which would result in impacts the same as Alternative A, slightly fewer adverse impacts than Alternative C, and much more beneficial impacts than Alternative B. Inside DDAs, Alternative D allows surface-disturbing activities closer than 500 feet if equivalent riparian-wetland protection could be achieved. This management would beneficially impact wildlife by protecting vital riparian-wetlands and adjacent upland habitats from loss, degradation, or fragmentation, although not as much as under Alternative B, which prohibits surface disturbance within a wider buffer around all riparian-wetland areas. Alternative D uses all tools, including range improvement projects, travel management strategies, and lease stipulations to improve riparian-wetland areas and move them toward PFC. Healthy and diverse riparian-wetland habitats would have beneficial impacts on wildlife, but could adversely impact wildlife by increasing fencing and livestock grazing levels associated with water developments. Alternative D would result in slightly more adverse impacts to wildlife than Alternative A, much more adverse impacts than Alternative B, and greater beneficial impacts than Alternative C.

Fish and Special Status Species

Similar to alternatives A and C, on a case-by-case basis, Alternative D allows BLM projects that remove or deplete water from fish-bearing streams unless the action would result in the loss of a sustainable fish population. Because Alternative D does not allow projects that would completely de-water a stream, it would result in slightly fewer adverse impacts to wildlife than alternatives A and C, but more adverse impacts than Alternative B, which does not allow water-depleting projects.

Alternative D opens the designated greater sage-grouse Core Area to oil and gas leasing subject to thresholds for project locations and acres of disturbance. Limiting the amount of disturbance in the greater sage-grouse Core Area would result in beneficial impacts to other wildlife occupying the same lands. Alternative D would result in fewer beneficial impacts than Alternative B and fewer adverse impacts than alternatives A and C. Greater sage-grouse lek buffers under Alternative D are the same as under Alternative B for the Core Area and the same as under alternatives A and C outside of the Core Area. Alternatives B and D would protect more wildlife habitat in the Core Area in the long term; Alternative D would protect fewer acres outside the Core Area than Alternative B. Alternative D applies a seasonal nesting TLS to all suitable nesting habitat in the greater sage-grouse Core Area, which would protect more acres of habitat than all the other alternatives and result in beneficial impacts to nesting neotropical migrants and raptors utilizing these same acres.

Alternative D allows livestock water developments in greater sage-grouse nesting habitat so long as they would be compatible with, and contribute to, improved greater sage-grouse habitat. Alternative D would result in greater beneficial impacts to other wildlife species that use these same habitats than alternatives A and C, but fewer than Alternative B.

Wild Horses

Like alternatives B and C, Alternative D establishes scenic loops for viewing wild horses in the planning area. Alternative D would result in a slightly greater risk of adverse impacts to wildlife from increased vehicle use and human presence related to viewing activities than Alternative A. Alternative D considers impacts to wild horses when authorizing new fencing projects, and fences would be removed or modified as opportunities arise to facilitate movement between wild horse herds. Not allowing new fences and removing/modifying existing fences would beneficially impact wildlife by reducing hazards to wildlife movement. Alternative D would result in greater beneficial impacts than alternatives A and C and fewer beneficial impacts than Alternative B.

Cultural and Paleontological Resources

The area of protection surrounding cultural and paleontological resources under Alternative D is much the same as the area of protection under Alternative A, and Alternative D protects more acres than Alternative C. Alternative D protects fewer acres of wildlife habitat associated with cultural and paleontological sites than Alternative B, particularly related to mineral exploration and development, and therefore would result in fewer beneficial impacts to wildlife than Alternative B.

4.4.6.3.5.3. Resource Uses

Minerals

Alternative D allows for locatable mineral entry on 2,757,625 acres of mineral estate (98 of the planning area). Adverse impacts to wildlife from habitat loss, modification, and/or fragmentation as a result of exploration and development activity would occur on 1 percent fewer acres than Alternative A, 2 percent fewer acres than Alternative C, and 56 percent more acres than Alternative B. Alternative D pursues continuation of the existing locatable mineral withdrawals protecting bighorn sheep and elk crucial winter range and parturition habitat in the Whiskey Mountain and East Fork ACECs. Like Alternative B, Alternative D pursues withdrawal of 3,314 additional acres in the expanded portion of the East Fork ACEC. Withdrawing the area from locatable mineral entry would provide long-term protection of crucial winter range needed to maintain elk and bighorn sheep populations. Alternative D also pursues a withdrawal for 3,897 acres in the Johnny Behind the Rocks RMZ, which would prevent the loss of wildlife habitat and beneficially impact species using the area. Alternative D would result in greater beneficial impacts to wildlife than alternatives A and C and more adverse impacts than Alternative B.

Alternative D opens a total of 2,254,741 acres to geothermal leasing and opens 2,351,440 acres to oil and gas leasing, 1 percent fewer acres than Alternative A and 2 percent fewer acres than Alternative C. Alternative D opens 76 percent more acres to leasing than Alternative B, which opens the fewest acres to mineral leasing and potential development. Alternative D makes available fewer acres of crucial winter range and parturition habitat to exploration and development than alternatives A and C but more acres than Alternative B. It is anticipated that approximately 724 acres would be disturbed each year through oil and gas development activities under Alternative D, and 375 of those acres would be disturbed for the long term. Alternative D would result in less wildlife habitat and habitat connectivity loss and fragmentation would occur from new lease development than alternatives A and C and more than Alternative B. Alternative D closes the entire Dubois area to oil and gas leasing; therefore, no habitat loss and fragmentation from lease development activities. Alternative D would have nearly the same beneficial impacts to wildlife in all statutory categories as Alternative B and greater beneficial impacts than alternatives A and C.

Alternative D's management of the Beaver Rim area has more beneficial impacts to wildlife than alternatives A and C through its application of an MLP. This is, however, less beneficial than Alternative B which closes the area to oil and gas leasing to protect greater sage-grouse.

Alternative D extends seasonal protections for big game crucial winter range, elk winter range, and raptor nesting habitat, and extends seasonal protections for special status species (greater sage-grouse and mountain plover) to activities deemed detrimental to wildlife associated with the O&M of developed projects on lands that lie outside DDAs. Appendix I (p. 1435) lists activities subject to seasonal protections. Alternative D does not apply seasonal protections to these same activities inside DDAs. Alternative D would result in greater beneficial impacts to wildlife during the sensitive winter and nesting periods than alternatives A and C and less than Alternative B, which applies seasonal protections to O&M activities on all lands.

Under Alternative D, lands closed to mineral leasing or subject to NSO are also closed to geophysical activities. Lands open to leasing are open to geophysical activities and subject to motorized travel limitations and restrictions on surface-disturbing and disruptive activities for the area. Closing habitats to geophysical activities would prevent adverse impacts from cross-country motorized travel and wildlife displacement. Restricting geophysical activities during sensitive times such as the breeding, nesting, and winter periods would prevent abandonment or loss of nests or young, which would result in short-term beneficial impacts to wildlife. Alternative D closes more wildlife habitat to geophysical activities than alternatives A and C and less than Alternative B.

Alternative D opens 37 percent fewer acres to phosphate leasing than Alternative A, 39 percent fewer acres than Alternative C, and 66 percent more acres than Alternative B. Closing lands to phosphate leasing would beneficially impact wildlife by providing long-term protection of habitat. Under Alternative D, elk and mule deer crucial winter range in the Red Canyon and Lander Slope ACECs is closed to leasing. In addition, lands in the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area with phosphate potential are closed, which would result in beneficial impacts to numerous other shrubland-obligate wildlife species in addition to greater sage-grouse. Alternative D would result in greater beneficial impacts to wildlife than alternatives A and C, because Alternative D closes more wildlife habitat to phosphate leasing; Alternative D opens more acres to phosphate leasing than Alternative B, thus would result in greater adverse impacts to wildlife.

Alternative D opens 1,376,935 surface acres to mineral materials disposals, many more acres than Alternative B, but fewer acres than alternatives A and C, which means less wildlife habitat, including sensitive or limited habitats, could be lost, modified, or fragmented from development activities. Alternative D would result in greater beneficial impacts than alternatives A and C, but more adverse impacts than Alternative B.

Lands

Alternative D identifies 5,436 acres of lands available for disposal by sale, exchange, or other methods, with an additional 1,435 acres available with restrictions on post-disposal use. Alternative D retains the same amount of acres in public ownership or with disposal restrictions as alternatives B and C and more acres than Alternative A. There would be less risk of adverse impacts from the loss or alteration of wildlife habitat under alternatives B, C, and D than under Alternative A, because Alternative A makes more lands available for disposal.

Renewable Energy

Alternative D opens 459,720 acres (19 percent of the planning area) to wind-energy development. Alternative D would result in a greater risk of adverse impacts to wildlife from habitat loss, fragmentation, and avoidance, particularly in sensitive or limited habitats, than Alternative B, which opens only 27 percent of the planning area. However, Alternative D would result in fewer adverse impacts from wind-energy development than alternatives A and C, which opens 88 percent and 95 percent of the planning area, respectively.

ROWs and Corridors

Similar to the mineral and other realty management actions discussed above, Alternative D opens fewer acres to ROWs than alternatives A and C and more acres than Alternative B. Alternative D excludes 35 percent of the planning area to ROWs and designates avoids 44 percent as ROW avoidance areas. ROW exclusion areas encompass 253,983 acres of big game crucial winter range and parturition habitat under Alternative D, and ROW avoidance areas encompass 210,721 acres of big game crucial winter range. Alternative D would result in greater beneficial impacts to wildlife from excluding or avoiding more lands than alternatives A and C, and more adverse impacts from closing fewer lands than Alternative B.

Livestock Grazing Management

Alternative D opens approximately 97 percent of the planning area to grazing, almost the same as the other alternatives. Alternative D closes 6,313 more acres than alternatives A and C and 6,526 fewer acres than Alternative B. The majority of the lands in the expanded portion of the East Fork ACEC and an allotment pasture in the Whiskey Mountain ACEC are closed to eliminate forage competition with wintering elk and bighorn sheep as well as the need to construct additional livestock control fencing.

Alternative D livestock management actions would disturb approximately 42 acres each year during construction and/or development of range improvements. Alternative D allows fewer range improvement projects overall than alternatives A and C, but allows for the construction of more riparian-wetland protection fencing than Alternative A. Adverse impacts to wildlife from the construction of additional fences would be greater under Alternative D than under alternatives A and B and less than under Alternative C. Fences and cattleguards installed for livestock management are removed or modified on a case-by-case basis. Type E fencing will be required for any new or modified highway ROW fence except in those areas bordering domestic sheep allotments or in areas where another fence standard is preferable. This management action would result in almost the same impacts as all the other alternatives.

Alternative D allows a moderate level of plant utilization when a Comprehensive Grazing Strategy is in place. Like Alternative C, higher plant utilization would increase the potential for forage competition between wildlife and livestock; Alternative B reduces that potential.

Like Alternative B, Alternative D prohibits the placement of salt or supplements within ½ mile of riparian-wetland areas and within 0.6 mile of greater sage-grouse leks. This action would prevent increased plant utilization and vegetation trampling in these key habitats, which would result in beneficial impacts to wildlife in all statutory categories. Alternative D would result in greater beneficial impacts to wildlife than alternatives A and C, which prohibit supplements only within ¼ mile of riparian-wetland areas.

Overall, livestock grazing under Alternative D would result in more beneficial impacts to wildlife and their habitats than alternatives A and C and more adverse impacts than Alternative B.

Recreation and Travel Management

Alternative D impacts to wildlife from recreation management actions would be the same as Alternative B, except that SRMAs and distinct ERMAs would constitute fewer acres under Alternative D. Management prescriptions that reduce or eliminate surface-disturbing activities (i.e., NSO for mineral leasing and locatable mineral withdrawal) in the Johnny Behind the Rocks Area and the Dubois Mill Site would provide long-term protection of wildlife habitat. Several SRMAs are in the Lander Slope ACEC and would be managed according to the ACEC prescriptions; this also would beneficially impact wildlife by limiting surface-disturbing activities. Alternative D would result in greater beneficial impacts to wildlife than alternatives A and C and fewer beneficial impacts than Alternative B.

Alternative D limits motorized travel on more acres than alternatives A and C and on fewer acres than Alternative B. Alternative D opens 92 percent of the planning area to existing roads and trails, opens 6 percent to designated roads and trails, and closes 1 percent to motorized and mechanized travel. Areas closed would result in the greatest beneficial impacts to wildlife by eliminating disturbance or displacement from vehicle use and providing long-term protection from habitat loss and fragmentation. Most of the areas closed to motorized travel are open to mechanized travel under Alternative D. These areas would result in slightly fewer beneficial impacts to wildlife than the areas closed to all travel.

Alternative D subjects more acres to seasonal travel limitations than alternatives A and C. The increase in acres occurs primarily in the East Fork ACEC. Dates for seasonal travel limitations in the Whiskey Mountain and East Fork areas are adjusted to match seasonal closure dates on adjacent WGFD lands. Seasonal travel limitations would protect wintering bighorn sheep and elk from stress and disturbance during the critical winter months. Using consistent closing and opening dates across the area would benefit the public and should help with compliance and enforcement of the closures.

Overall trail and travel management actions under Alternative D would result in fewer adverse impacts to wildlife than alternatives A and C and fewer beneficial impacts than Alternative B.

4.4.6.3.5.4. Special Designations

Alternative D designates eight ACECs totaling 245,037 acres (10 percent of the planning area), 5 percent more of the planning area than Alternative A, 10 percent more of the planning area than Alternative C, and 52 percent less of the planning area than Alternative B. Management would result in direct beneficial impacts to wildlife in the long term through protections from habitat loss or fragmentation by (1) closing lands to mineral leasing, (2) extending existing or pursuing new locatable mineral entry withdrawals, (3) closing or limiting motorized vehicle use, (4) excluding major utility systems, ROWs, and wind-energy development, and (5) prohibiting other surface-disturbing activities not compatible with retaining or enhancing the areas' values. The East Fork and Green Mountain ACECs are larger under Alternative D than under Alternative A, increasing the amount of crucial winter range and parturition habitat covered by ACEC prescriptions. Alternative D does not designate the Dubois Badlands area as an ACEC and incorporates the 200 non-contiguous acres to the east of the badlands into the East Fork ACEC. This would not result in additional adverse impacts to wildlife because the IMP for the Dubois Badlands WSA would still protect wildlife habitat. Alternative D closes crucial elk and bighorn sheep winter range and parturition habitat in the East Fork ACEC and part of the Whiskey Mountain ACEC to livestock grazing to eliminate forage competition between wildlife and livestock. Alternative D management of mineral and realty actions in the Whiskey Mountain and East Fork ACECs is the same as alternatives A and B, and are the most restrictive possible. Alternative D designates the Twin Creek ACEC, which is a much smaller portion of the Government Draw/Upper Sweetwater Sage-Grouse ACEC designated under Alternative B. To prevent adverse impacts to wildlife habitat, oil and gas leasing in the Twin Creek ACEC would be subject to an NSO stipulation, the ACEC would be closed to phosphate leasing and mineral materials disposals, and excluded for major ROWs outside the designated corridor. Alternative D establishes the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education

Area, which would be managed for long-term protection of greater sage-grouse habitat, therefore would also protect habitat for all other sagebrush-obligate wildlife species using the area. The Beaver Rim, Lander Slope, and Red Canyon ACECs contain the same number of acres under Alternative D as Alternative A, although Alternative D has slightly more restrictive prescriptions regarding surfacing-disturbing activities that would have a beneficial impact on wildlife.

Alternative D includes more protections along NHTs and the CDNST than Alternative A except for the part of the CDNST in the Crooks Gap area. Additional constraints for surface-disturbing activities to protect the integrity and setting of trails would have a beneficial impact on wildlife habitat. Alternative D would result in greater beneficial impacts to wildlife from trail protections than alternatives A and C and fewer beneficial impacts than Alternative B.

Alternative D recommends NWSRS-eligible waterway segment on Baldwin Creek and the Sweetwater River as suitable for inclusion in the NWSRS and manages those segments in accordance with the Lander Slope ACEC and Sweetwater Canyon WSA prescriptions, respectively; this management constrains mineral and realty developments. Alternative D includes more protections from surface-disturbing activities than Alternative A because Alternative D increases protections in the Lander Slope ACEC and Sweetwater Canyon WSA. Alternative D also would result in greater beneficial impacts than Alternative C, but more adverse impacts than Alternative B.

Alternative D management actions would result in greater beneficial impacts to wildlife and wildlife habitat than alternatives A and C and less beneficial impacts than Alternative B. Although Alternative D does not close the expanded Green Mountain ACEC to oil and gas leasing, the most important parturition areas are NSO, which beneficially impacts the elk.

4.4.7. Special Status Species – Plants

For purposes of this analysis, special status plant species addressed in this section currently include 12 BLM sensitive plant species known to occur in the planning area, three federally listed plant species that occur or for which there is potential habitat, and one federally listed plant species that occurs downstream along the Platte River and could be affected by actions in the planning area. The implementation of certain management actions could impact special status plants species, depending on the alternative. This section describes the direct, indirect, short-term, and long-term impacts to special status plants under each alternative and also whether those impacts would be adverse or beneficial.

Typically, management actions or resource uses that contribute to a decrease in abundance or distribution of a special status plant species are considered adverse. Conversely, management actions or measures that protect a plant species from disturbance, improve habitat, or lead to increased population or viability are considered beneficial.

For purposes of this analysis, direct impacts are damage to or loss of individual plants, loss of habitat or habitat quality, loss of pollinators, and loss of soil seed banks. Examples of direct impacts include surface-disturbing activities, herbivory, trampling, fire, plant collection, OHV use, or geophysical operations. Indirect impacts include the loss of suitable habitat for future colonization. Conversely, an action that aids in the protection of suitable habitat is an indirect beneficial impact.

4.4.7.1. Summary of Impacts

Activities that disturb soil and vegetation communities would directly impact special status plants. Alternative B provides the greatest protection from surface-disturbing activities because it allows the fewest acres of surface disturbance, requires surveys before authorizing activities that would prevent plant loss, and establishes limits on habitat loss, modification, or fragmentation. Conversely, Alternative C has the greatest potential to result in adverse impacts to special status plants because it allows the most acres of surface disturbance and does not establish habitat loss limits except as required to protect ESA-listed species. Alternative D is similar in many respects to Alternative A, but Alternative D includes management actions to minimize habitat loss and fragmentation not included under Alternative A and increases protections in areas important for other resources, particularly wildlife, special status wildlife species, cultural resources, and special designation areas that also protects special status plants.

4.4.7.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Surface-disturbing activities in special status plant communities will adversely impact special status plant species. Impacts to special status plants and their habitats will be more adverse than impacts to common plant species.
- Where resources overlap, management actions associated with protecting wildlife habitats and cultural resources directly benefit special status plant species.
- Establishing management actions that preclude or restrict development, including those specifically focused on conserving special status plant species, are assumed to benefit special status plant species where populations overlap with management action boundaries.
- Because neither the locations of all special status plant species in the planning area nor the locations of potential actions under the different alternatives are not known, this impact analysis is based on the amount of vegetation and soil disturbed, the potential for spread of INNS, and the level of restrictions placed on BLM actions that would protect special status plant species.
- The total amount of new surface disturbance allowed under an alternative is a good index of potential impacts to special status plants. Success of reclamation measures prescribed as a condition of development is unknown, and could underestimate the potential impact of surface disturbance on special status plant populations.
- Reclamation of surface disturbance and reestablishment of vegetation minimizes adverse impacts to soils and, therefore, to special status plant species. The sooner vegetation is reestablished, the greater the benefit to special status plant species.
- As more monitoring and survey data become available, additional populations of existing special status plants could be found.
- The BLM will continue to manage plant species listed on the BLM Wyoming State Director’s Sensitive Species List in accordance with BLM Manual 6840. Over the planning period, plant species could be added or removed from the BLM Sensitive Species list as additional data are collected and evaluated.
- The USFWS has jurisdiction over the management of threatened and endangered plant species. Actions that could impact ESA-listed species are subject to appropriate ESA Section 7 consultation with the USFWS.
- Over the planning period, the USFWS could list or delist plant species as threatened and endangered as additional data are collected and evaluated. Most species delisted or

downgraded from proposed or candidate status will be included on the BLM sensitive species list.

4.4.7.3. Detailed Analysis of Alternatives

Management actions and resource uses that could adversely impact special status plant species and their habitats include all surface-disturbing activities, concentrated grazing by livestock, wild horses, or native ungulates, control of INNS, OHV use, geophysical exploration, fire management, and water-depleting activities, especially those involving the Platte River watershed.

Conversely, resource uses prescribed under the alternatives that could result in adverse impacts to special status plant species could be limited by management actions necessary to protect these plant species.

4.4.7.3.1. Impacts Common to All Alternatives

Although the types of impacts to special status plant species under the alternatives would be similar, the intensity of impacts would vary by alternative. Impacts that result in a decline in abundance or distribution of special status plant species can generally be divided into two broad categories: (1) impacts that cause direct loss of plants through surface disturbance, geophysical exploration, trampling, herbivory, fire, or INNS treatment and (2) impacts that cause indirect loss of plants through alteration of habitat by fragmentation, soil compaction and erosion, alteration of hydrologic regimes, loss of pollinators, and introduction or proliferation of INNS. Direct impacts typically are short-term, whereas indirect impacts can be short-term or long-term.

Under all alternatives, actions that could impact any federally listed plant species will require consultation and coordination with the USFWS to ensure compliance with the terms of Statewide Programmatic Section 7 consultations (conservation measures, letters of concurrence, biological assessments, and biological opinions) and to develop and implement protective measures. These measures specifically include a locatable mineral withdrawal and fire suppression pre-planning to protect desert yellowhead critical habitat from disturbance and applying a NSO stipulation to mineral leasing activities to protect the two known desert yellowhead populations.

Water can adversely impact certain special status plant species that occur in riparian-wetland habitats if it is associated with flooding or excessive sedimentation. Such conditions could cause direct plant loss from established plants being uprooted or water and silt covering plants, reducing photosynthesis. Conversely, actions that improve water quality or reduce the chances of flooding are beneficial to riparian-wetland plant communities.

Direct plant mortality and habitat loss can occur from surface-disturbing activities, including those related to mineral and realty actions. Geophysical activities that utilize vibroseis buggies can crush plants and result in plant mortality. Surface-disturbing activities also can indirectly impact special status plants by contributing to soil erosion and transporting INNS into plant habitats. Due to the patchy distribution of most special status plant populations, surface disturbance can result in habitat fragmentation, isolating populations and preventing cross-pollination needed to maintain the species.

Forest management actions would directly impact limber pine, a BLM sensitive species. The presence of forest insects, particularly the pine beetle, and disease threatens limber pine populations in the planning area. Silviculture practices that lead to large-scale removal of diseased trees can increase soil erosion and allow INNS to move into these areas. However, without treatment, large populations of limber pine could be lost until forest regeneration takes place.

The spread of INNS can adversely impact special status plants to a greater degree than general plants due to the limited size and distribution of these species. INNS such as tamarisk and Russian olive can occupy sites that might be suitable for Ute ladies'-tresses and persistent sepal yellowcress. Management that addresses activities that can spread INNS would result in beneficial impacts to special status plant populations. INNS can be transported onto or within BLM-administered public lands through livestock fecal material. This transport can be reduced by requiring that livestock be held off public lands until INNS seeds are expelled ("livestock flushing"); the requirement for livestock flushing varies by alternative. Treatments for the control of INNS can result in beneficial and adverse impacts to special status plants. If carefully performed, treatments that reduce INNS could increase the potential for special status plants to reestablish in areas previously lost to INNS. However, the use of non-specific herbicides could affect growth or reproduction of special status plants. In isolated cases, herbicide treatment could result in direct plant mortality.

Livestock grazing can adversely and beneficially impact special status plants, depending on grazing intensity, timing of grazing, and range conditions. Livestock grazing can reduce competition between all plant species occupying the site, but also can cause direct mortality through trampling, herbivory, and general site degradation (e.g., soil erosion and compaction). Wild horse grazing could result in similar impacts, but those impacts would be limited to HMAs. Because wild horse numbers do not vary among the alternatives, potential impacts would be the same under all alternatives.

Travel management can adversely impact special status plants if motorized travel is allowed in areas with these species. Vehicles can disturb soil, remove vegetation, and create dust that can adversely impact plant growth and reproduction, or facilitate the spread of INNS.

Management in special designation areas, such as ACECs, WSAs, and along NHTs, ultimately protects special status plants by avoiding or prohibiting surface-disturbing activities in these areas. These designations could increase public use of these areas, which would result in an increased potential for disturbance and the spread of INNS.

Impacts to special status plant species from air quality, geologic resources, and cave and karst resources management does not vary by alternative. No lands identified for disposal support known threatened and endangered plants. Before disposal, identified lands will be evaluated for the presence of threatened and endangered plants, and if they are present, the BLM will not dispose of the lands. It is not known whether BLM sensitive plants occur on lands identified for disposal; however, a survey will be performed before any disposal activity and if threatened and endangered plants are present, appropriate mitigation will be applied to protect the species which may include not completing the disposal action. Acquired lands that contain special status plants will be a beneficial impact as plants will be subject to BLM management that considers appropriate protection when determining uses of the lands.

4.4.7.3.2. Alternative A

4.4.7.3.2.1. Program Management

Under Alternative A, mitigation will be applied to authorized activities, including travel management, to protect special status plant populations on a case-by-case basis. Mitigation will provide some protection for plants and could include moving project locations, closing roads, or applying a protective buffer to prevent surface-disturbing activities around plant populations. Mitigation of potential impacts to threatened and endangered plants will be coordinated with the USFWS as part of the consultation process.

Alternative A establishes acceptable limits for habitat loss, modification, or loss of function for special status plants on a case-by-case basis. These limits would have a beneficial impacts as limits would protect against substantial declines in plant populations that could contribute to the need to list BLM sensitive species under ESA.

Alternative A chemical treatments and range improvement projects in habitats for BLM sensitive plant species could adversely impact individual plants and plant communities, particularly where plant survey data are lacking. These actions could cause direct plant mortality, fragment populations, and/or alter the associated plant community due to chemical spraying or construction activities. Many of these plant species exist only in communities that contain a specific suite of plant species. Therefore, there could be indirect impacts from changes to the associated plant community.

4.4.7.3.2.2. Resources

Soil erosion and fugitive dust from disturbed areas such as roads, mineral and realty developments, and heavily grazed areas could cover special status plants and reduce photosynthesis. Soil erosion or compaction can adversely impact special status plants by depriving them of essential nutrients, organic matter, or water. Moreover, many special status plant species are rare because they are associated with rare soils or habitat conditions. If these conditions are lost or altered, it might not be possible for that species to continue to survive in the same location even with the best efforts at site reclamation. Conservation measures that prevent soil erosion or compaction diminish the adverse impacts to special status plants. Under Alternative A, cumulative short-term surface disturbance in the planning area would be expected to be approximately 52,591 acres and long-term surface disturbance is anticipated to be 12,439 acres during the planning period.

Alternative A manages forest insect and disease outbreaks in limber pine stands on a case-by-case basis and uses a variety of silviculture techniques (e.g., clear-cuts, selective cutting, and thinning) to treat forest health conditions. Aggressive treatment methods would likely be the most successful at reducing the spread of disease and insect infestations in limber pine stands. These same treatments could adversely impact other special status plants occurring in adjacent landscapes by increasing soil erosion. Forests could be replanted, including planting of limber pine seedlings, if timely natural regeneration does not occur following timber sale, forest treatment, or wildfire.

Wildfire, and to some degree, prescribed fires, could result in adverse and beneficial impacts to special status plants, depending on intensity. Approximately 800 acres per year of treatments to reduce fuels and manage vegetation would be expected under Alternative A. Of these acres, approximately 37 percent would be treated with prescribed fire, which poses a greater risk of unintended adverse impacts than mechanical treatments. In situations where the fire is intense, temperatures could be high enough to destroy both the plants and the soil fertility upon which they depend. However, in low-intensity, lower temperature fires, special status plants might be only top-killed and could resprout with greater vigor. Low-intensity fuels reduction burning also could beneficial by preventing the loss of special status plant communities from more landscape-level wildfires. Vegetative treatments utilizing mechanical methods are much easier to control than prescribed fire because equipment can be directed at specific areas and away from special status plants.

The introduction or proliferation of INNS results in very adverse impacts to special status plant species. Typically, INNS are able to outcompete native plants, whether they are special status or common, and establish themselves in habitats that might otherwise be suitable for colonization by special status species. In so doing, they limit the abundance and distribution of special status plants. Under Alternative A, activities that contribute to the spread of INNS will be managed on a case-by-case basis. Management actions could include requiring that construction equipment previously used in areas with INNS be washed before being used in new areas. Alternative A does not require livestock flushing. Special status plants in areas where INNS are not addressed will be adversely impacted.

Management actions that establish additional protections for wildlife and special status wildlife species and their habitats would beneficially impact special status plant communities. Alternative A prohibits surface-disturbing activities in a ¼-mile buffer around greater sage-grouse leks. This buffer would protect special status plants on approximately 16,283 acres from activities that could remove or damage plants. Alternative A closes redundant roads and allows range improvements (fences and water developments) and new roads in big game crucial winter range on a case-by-case basis. Where applied, closing roads and not allowing new roads and range improvements would beneficially impact special status plants by protecting habitat from construction and vehicle disturbance.

Alternative A management actions that protect cultural, paleontological, or visual resources from disturbance would beneficially impact special status plant communities that occupy the same site. Various levels of protection could be applied to a proposed project, depending on the relative importance of the resources found which would also protect special status plant habitat.

4.4.7.3.2.3. Resource Uses

Exploration (including geophysical operations) and development of locatable and leasable mineral resources and mineral material disposals would only result in adverse impacts by directly removing individual plants or entire communities in the short term or removing or fragmenting potential habitat in the long term. As previously stated, reclamation efforts are not likely to reestablish the necessary conditions for a rare plant community. Under Alternative A, activities associated with mineral resource development would be expected to produce approximately 21,234 acres of short-term disturbance and 9,895 acres of long-term disturbance on BLM-administered lands during the planning period.

Alternative A adverse impacts to special status plants and their habitats from wind-energy development, ROWs, and utility corridors would be essentially the same as impacts from mineral exploration and development activities. All of these uses involve some level of surface disturbance that could directly remove plants and their habitat, or fragment the remaining habitat as to limit the abundance and distribution of these species. In addition to these short-term impacts, such disturbances would add to the production of fugitive dust and its associated long-term impacts. Alternative A opens 2,113,512 acres (88 percent of the planning area) to wind-energy development and 2,188,294 acres (91 percent of the planning area) to ROWs. Alternative A designates one ROW/utility corridor in the planning area.

Livestock grazing can produce adverse and beneficial impacts to special status plant species. Range improvement projects in habitats for BLM sensitive species can remove plants or fragment habitats through construction activities, structure placement, or concentrated trampling. If livestock are allowed to concentrate, as would occur around watering locations or supplement sites, plants could be lost by heavy grazing use or trampling. Moreover, trampling and high plant utilization could result in soil compaction or erosion, making the site unsuitable for potential habitat in the long term and contributing to the establishment of INNS. Conversely, beneficial impacts to special status plant species could result if livestock grazing removes competing vegetation that allows special status plants to thrive. Alternative A allows for livestock grazing on 2,324,934 acres in the planning area.

Recreation management could result in a variety of impacts, both adverse and beneficial, to special status plants and their habitats. Areas surrounding developed recreation sites or areas that receive high recreational use such as mountain biking, hiking, and OHV use can adversely impact special status plant habitats by crushing or killing plants or facilitating INNS movement and establishment. Unauthorized establishment of trails, whether by hikers or OHV users, also can result in soil erosion and compaction and the generation of fugitive dust. Recreation areas that limit motorized travel or constrain mineral and realty actions would result in beneficial impacts to special status plants. Under Alternative A, most of the intensive recreation areas in the planning area do not have special management prescriptions that limit surface-disturbing activities.

Much like recreation management, travel management decisions can adversely and beneficially impact special status plants and their habitats. Roads and trails that bisect special status plant habitats can cause population declines. Conversely, proper trails and travel management can be used to designate roads and trails that will avoid special status plant populations. Alternative A closes 5,923 acres (0.25 percent of the planning area) to motorized travel, which would beneficially impact special status plants in those areas. In addition, Alternative A designates open roads and trails on 163,075 acres (7 percent of the planning area), which would reduce the number of roads and the potential for adverse impacts from vehicle travel. Alternative A limits motorized travel on approximately 93 percent of the planning area to existing roads and trails; this could contribute to special status plant loss and habitat fragmentation.

4.4.7.3.2.4. Special Designations

Areas designated for special management under Alternative A, such as ACECs, Congressionally Designated Trails, WSRs, and WSAs, would beneficially impact special status plant species and their habitats to the extent that special management provides added protection from disturbance. Two existing ACECs, Red Canyon and Beaver Rim, include special status plants as part of their relevance and importance criteria for designation, although other ACECs support special status plants. Travel management and mineral and realty actions in special designation areas are subject to greater restrictions than surrounding lands. This would result in long-term beneficial impacts by protecting existing plant communities and protecting potential future communities in suitable, undisturbed habitat. Under Alternative A, a total of 169,229 acres are so designated.

4.4.7.3.3. Alternative B

4.4.7.3.3.1. Program Management

Alternative B establishes acceptable limits for habitat loss, modification, or loss of function for special status plants. Limits will be used to preclude substantial changes in habitat that would contribute to the need to list BLM sensitive species under the ESA. Alternative B closes areas containing special status plant populations to motorized or mechanized travel and applies an NSO stipulation to development of mineral leases. In addition, Alternative B excludes areas with special status plant populations from major ROWs. Closing populations to habitat disturbance from mineral and realty actions and vehicle travel would result in long-term beneficial impacts to individual plants or plant populations.

Alternative B prohibits chemical vegetative treatments within ¼ mile of BLM sensitive plant species except when needed to protect or enhance their habitats. Buffers may be enlarged on a site-specific and species-specific basis. Alternative B does not allow chemical treatments to alter plant community composition, such as reducing sagebrush; however, it does allow the treatment of weeds that are threatening the existence of BLM sensitive plants. These actions would protect special status plants from the potential adverse impacts of chemical spraying.

Alternative B prohibits range improvement projects within ½ mile of BLM sensitive plants to prevent loss or disturbance, unless those projects would benefit the affected plant species. This buffer would protect plants from soil loss and the impacts from livestock concentration and trailing associated with water developments and fences.

Before surface-disturbing activities are authorized, Alternative B requires potential habitat in the project area to be surveyed for BLM sensitive plants. Required surveys would have a beneficial impact by preventing the loss or fragmentation of habitats on and around the project site or the permanent placement of facilities within plant communities. Alternative B allows surface-disturbing activities if protective measures can be implemented to mitigate or eliminate adverse impacts.

4.4.7.3.3.2. Resources

Impacts to special status plant species from sources such as fugitive dust, soil erosion or compaction, and excess runoff or sedimentation of water resources are typically products of surface disturbance. Under Alternative B, cumulative short-term surface disturbance for the planning period would be expected to be approximately 74,689 acres, or approximately 30 percent more acres than under Alternative A. Anticipated long-term surface disturbance will be 7,502 acres, or approximately 40 percent fewer acres than Alternative A.

Restricting motorized and mechanized vehicle travel on 5,490 acres of non-WSA lands with wilderness characteristics in the Little Red Creek Complex would reduce the risk of disturbing special status plants in that area. Alternative B would result in greater beneficial impacts to special status plants than Alternative A, which does not specifically manage these lands.

Alternative B treatment of forest insect and disease outbreaks in limber pine stands will focus in WUI areas and around developed campgrounds to address human safety concerns. Limiting treatment to these areas would likely result in the additional loss of limber pine stands in the planning area and facilitate the spread of disease and insect infestations into unaffected stands.

Alternative B vegetative treatments by prescribed burning and mechanical means would increase substantially over Alternative A. Approximately 2,500 acres of treatments are estimated per year, more than triple the number of acres under Alternative A. Of these treatment acres, approximately 40 percent of the acres would be treated using prescribed fire. With the increase in acres treated by prescribed fire under Alternative B, there would be a greater risk that more acres could experience higher temperature fires that could kill special status plants and affect soil fertility. Assuming that these treatments were carefully planned and implemented, there could be beneficial impacts to special status plant communities through reducing the risk of wildfire, which would likely result in more adverse impacts than beneficial impacts.

Compared to Alternative A, Alternative B increases protections for wildlife and special status wildlife species and their habitats, which would increase the protection of special status plant communities. Alternative B increases the size of greater sage-grouse lek buffers, which would protect 77,127 more acres from surface-disturbing activities than Alternative A. Alternative B closes redundant roads and prohibits range improvements and new roads in big game crucial winter range (605,898 acres) which will reduce adverse impacts from soil loss or fragmenting habitats associated with road development. Alternative B adverse impacts from soil erosion, fugitive dust, and habitat fragmentation would be less than under Alternative A. Alternative B is more protective, and therefore would result in greater beneficial impacts to special status plants than Alternative A, which addresses these issues only on a case-by-case basis.

Alternative B places more emphasis on reducing or managing activities that facilitate the spread of INNS. This includes such techniques such as requiring livestock flushing and stricter controls on authorized activities to prevent INNS spread from one area to another. Unlike Alternative A, Alternative B would treat annual brome species throughout the planning area instead of in specific areas. These additional efforts would likely reduce impacts to special status plant species from INNS establishment and spread more than management under Alternative A.

Compared to Alternative A, Alternative B substantially expands protections for cultural, paleontological, and visual resources to include entire landscapes or viewsheds around important resources. These expanded protections from surface disturbance would beneficially impact special status plant communities that occupy the same sites. Compared to Alternative A, Alternative B increases surface use restrictions for VRM in the planning area because Alternative B designates more acres to VRM Class II than Alternative A. Alternative B would result in greater beneficial impacts to special status plants than Alternative A.

4.4.7.3.3.3. Resource Uses

Alternative B increases constraints on exploration for, or development of, locatable or leasable minerals and mineral materials disposals for the purpose of protecting other resource values, including special status plant communities. Over the planning period, Alternative B would be expected to produce approximately 16,549 acres of short-term disturbance on BLM-administered lands and 7,378 acres of long-term disturbance, 22 percent and 25 percent fewer acres respectively, than Alternative A. Alternative B makes fewer acres available for exploration and development, thus reducing the potential for surface disturbance and result in greater beneficial impacts to special status plants and their habitats than Alternative A.

Alternative B closes much of the planning area to wind-energy development, leaving only 41,372 acres open. Alternative B closes 91 percent more acres to wind-energy development than Alternative A, which would reduce the risk of adverse impacts from plant and/or population losses to special status plants. In addition, Alternative B opens fewer acres to ROWs and restricts major ROWs to designated corridors. Alternative B would provide more protection from surface disturbance that could adversely impact special status plant species than Alternative A.

Although Alternative B manages 2,312,095 acres as open to livestock grazing, or approximately the same number of acres as Alternative A, Alternative B requires light (21 to 40 percent) plant utilization, while Alternative A allows a higher plant utilization level on a case-by-case basis. Alternative B also prescribes livestock grazing management primarily without the use of infrastructure or range improvements. Where projects are authorized, range improvements would be prohibited within ½ mile of BLM sensitive plants to prevent loss or disturbance, unless those range improvements would benefit the affected plant species. This buffer would protect plants from the impacts of livestock concentrations and trailing associated with water developments and fences. Alternative B would reduce the likelihood of adverse impacts from project construction, livestock trampling, heavy grazing utilization, and the introduction of INNS; this management would result in greater beneficial impacts to special status plants than Alternative A.

Alternative B expands the recreation program to include numerous new recreation management areas to facilitate various types of recreation use. Alternative B decreases acreage of the Lander General ERMA by 536,770 acres to provide more specific management in SRMAs and other ERMAs. SRMAs and distinct ERMAs will have management prescriptions to enhance recreation values, including restricting surface uses from mineral and realty actions, which would ultimately result in beneficial impacts to special status plants in these areas. Plant communities in areas receiving high recreation use could be adversely impacted from activities that could result in loss or damage of plants (biking, hiking, etc.) although it is expected that these adverse impacts would be very localized. Alternative B would result in greater beneficial impacts to special status plants from increased protections than Alternative A.

Compared to Alternative A, Alternative B increases the number of acres closed to motorized travel to 71,761 acres (3 percent of the planning area). Alternative B designates open roads and trails on 193,704 acres (8 percent of the planning area). Alternative B would result in greater beneficial impacts to special status plants by reducing the potential for soil erosion, plant removal, and habitat fragmentation from motorized vehicles.

4.4.7.3.3.4. Special Designations

In addition to the protections afforded special status plants through special management area designations under Alternative A, Alternative B designates several new ACECs and expands the protections for existing special designation areas. Although most of these ACECs contain habitat for special status plants that contribute to the areas' values, special status plants are not the primary reason for the designations. Increased protections from plant disturbance and loss related to travel management and mineral and realty actions would beneficially impact special status plant populations and habitat in these special management areas. Alternative B includes 1,325,818 more acres of special designation than Alternative A, substantially increasing the acres of protections for special status plants.

4.4.7.3.4. Alternative C

4.4.7.3.4.1. Program Management

Alternative C establishes acceptable limits for habitat loss, modification, or loss of function only as required by the USFWS for threatened and endangered species. Alternative C addresses cumulative habitat losses for BLM sensitive plant species on a case-by-case basis, which could lead to reduced habitat availability and population declines. Approximately 160,065 acres of cumulative short-term surface disturbance would be expected to occur in the planning area during the planning period, approximately 115 percent more than under Alternative B and 204 percent increase over Alternative A. Cumulative long-term soil disturbance would be expected to be 60,631 acres, or 400 percent more than Alternative A and 700 percent more than Alternative B. Alternative C would result in a greater risk of actions that would contribute to listing of BLM sensitive species under the ESA than alternatives A and B. Alternative C allows motorized travel in special status plant habitat on existing roads and trails, and allows surface-disturbing activities unless they would result in loss of the special status plant population. Allowing surface disturbance from mineral, realty, and vehicle travel activities in these habitats would increase the potential for overall species declines that could contribute to the need to list the species.

Similar to Alternative A, Alternative C allows chemical vegetative treatments in BLM sensitive plant habitat unless the treatment would cause direct plant mortality. Unlike Alternative B, Alternative C does not address adverse impacts from treatments to the associated plant community where these plants occur, which could lead to habitat modifications such that the area could no longer support the sensitive species.

Alternative C does not require complete inventories for BLM sensitive plants prior to authorizing activities. If plants are known to occur in the project area, appropriate mitigation will be applied on a case-by-case basis. Authorizing activities in areas for which there is no plant distribution information could result in the loss of individual plants or entire plant populations. Alternative C would result in a greater potential to adversely impact BLM sensitive plants than alternatives A and B.

4.4.7.3.4.2. Resources

Approximately 160,065 acres of cumulative short-term surface disturbance would be expected to occur in the planning area under Alternative C, approximately 115 percent more than under alternatives A and 200 percent increase over Alternative B. Cumulative long-term soil disturbance would be expected to be 60,631 acres, or 400 percent more than Alternative A and 600 percent more than Alternative B. Increased surface disturbance can lead to plant loss, soil erosion or compaction, and/or excessive runoff into riparian-wetland habitats. Adverse impacts to special status plants from surface disturbance would be greater under Alternative C than under alternatives A and B.

Like Alternative A, Alternative C does not apply special management to lands with wilderness characteristics in the Little Red Creek Complex. Therefore the alternative affords no additional protection for special status plant species from potential disturbance caused by vehicle travel. Alternative C would result in fewer beneficial impacts to special status plants than Alternative B, which closes these lands to motorized and mechanized travel.

Similar to Alternative A, Alternative C employes a full range of silviculture methods to address forest health goals and treat insect and disease outbreaks in limber pine stands. Whereas Alternative A utilizes treatments on a case-by-case basis, Alternative C aggressively treats infestations to reduce limber pine loss and prevent the insect and disease spread into unaffected areas. Alternative C would result in greater beneficial impacts to these special status plant species than alternatives A and B.

Alternative C annual vegetative treatments by prescribed burning and mechanical methods will occur on the same number of acres as Alternative A and 1,700 fewer acres than Alternative B. The proportion of prescribed fire treatment to mechanical treatment is also the same as Alternative A. There would be less risk of adverse impacts to special status plants from prescribed fire under Alternative C than under Alternative B; however, there would also be a reduction in the potential for beneficial impacts that can occur from reducing wildfires.

Alternative C INNS treatment is the same as Alternative A. This approach would be expected to produce the same level of beneficial impacts to special status plants as under Alternative A.

Alternative C protects greater sage-grouse leks with a ¼-mile buffer, which is the same number of acres of associated special status plant habitat protected as Alternative A and 17 percent of the total acres protected under Alternative B. Alternative C does not close redundant roads and allows range improvements and new roads in big game crucial winter range; this could result in associated special status plant losses or population fragmentation. Alternative C would result in more adverse impacts to special status plant species than Alternative A and much more adverse impacts than Alternative B.

Under Alternative C, the levels of surface use protections for cultural, paleontological, and visual resources are the same or less than under Alternative A and much less than under Alternative B. Areas closed to surface-disturbing activities under Alternative B are open under Alternative C, which would provide less protection to special status plant populations. Alternative C VRM classifications are also less restrictive of surface-disturbing activities, because Alternative C designates a larger portion of the planning area as VRM Class IV.

4.4.7.3.4.3. Resource Uses

Alternative C eases constraints for the purpose of protecting other resource values, including special status plant communities, on exploration and development of locatable and leasable minerals and mineral material disposals. Alternative C does not pursue withdrawals from locatable mineral exploration and allows existing withdrawals subject to expiration to expire. Fewer restrictions on minerals exploration and development would increase the likelihood of more surface disturbance and increase the likelihood of disturbance to special status plants and their habitats. More acres are open to surface-disturbing activities under Alternative C than under the other alternatives; therefore, Alternative C would be expected to result in more long-term surface disturbance in the planning area than alternatives A and B. Actions associated with these activities on BLM-administered lands would be expected to produce approximately 21,302 acres of short-term disturbance and 9,932 acres of long-term disturbance during the planning period. Short-term and long-term disturbance acres under Alternative C would be approximately the same as under Alternative A, and 22 percent and 25 percent more acres, respectively, than under Alternative B.

Alternative C opens 2,284,235 acres (95 percent of the planning area) to wind-energy development, which is approximately 8 percent more acres than Alternative A and 93 percent more acres than Alternative B. Similarly, Alternative C opens more lands to ROWs (94 percent of the planning area) and manages less land as ROW exclusion or avoidance areas (147,053 and 11,714 acres, respectively) than alternatives A and B. Alternative C designates utility corridors on 660,908 acres, 27 percent more than Alternative B. Alternative C opens more lands to wind energy and ROW development than alternatives A and B, and would result in a greater risk of surface-disturbing activities that could adversely impact special status plants. Alternative C would result in more adverse impacts to special status plant species than alternatives A and B.

Alternative C allows livestock grazing on approximately the same number of acres as Alternative A, but allows moderate (41 to 60 percent) utilization while Alternative A establishes utilization levels on a case-by-case basis. Alternative C also prescribes a more intensive use of infrastructure or range improvements to manage livestock. The provisions under Alternative C would tend to increase the likelihood of adverse impacts (e.g., trampling and introduction of INNS) and increase the likelihood of over-utilization of special status plants. Alternative C allows range improvement projects in BLM sensitive plant habitats on a case-by-case basis. Project impacts that are not properly mitigated could result in plant removal and habitat fragmentation. Alternative C impacts would the same as impacts under Alternative A and less beneficial than impacts under Alternative B, which utilizes project buffers to protect plants.

Potential adverse impacts to special status plants from recreation management would increase under Alternative C. Although the number of total acres in specific (not Lander General) SRMAs or ERMAs is greater (332,055 acres) under Alternative C, restrictions on motorized travel are essentially the same or less than under alternatives A and B.

Travel management under Alternative C is similar to management under Alternative A. Alternative C closes 451 fewer acres to motorized travel than Alternative A and 66,289 fewer acres than Alternative B. Alternative C designates open roads and trails on 50,776 acres (2 percent of the planning area), which is a decrease of 5 percent from Alternative A and a decrease of 6 percent from Alternative B. Alternative C would result in a greater potential for adverse impacts to special status plants than alternatives A and C by increasing the potential for plant loss and habitat fragmentation.

4.4.7.3.4.4. Special Designations

As opposed to the protections afforded special status plant habitats by special management designations under alternatives A and B, Alternative C does not designate any new ACECs or the ones identified in the 1987 RMP. Special status plants in ACECs established in 1987 would not be subject to special management that limits surface-disturbing activities that can cause plant loss or habitat fragmentation. Travel management and mineral and realty actions are subject to the basic level of restrictions, except in WSAs. Fewer protections from surface disturbance under Alternative C would increase the likelihood of adverse impacts to special status plants and their habitats in these areas.

4.4.7.3.5. Alternative D

4.4.7.3.5.1. Program Management

Alternative D establishes acceptable limits for habitat loss, modification, or loss of function for priority special status plants. Priority plants will be identified based on the amount of habitat present and how threatened the habitat is from activities occurring in the planning area. Controlling the amount of habitat loss and fragmentation that can occur from surface-disturbing activities would have a beneficial long-term impact on these species. Like Alternative A, Alternative D applies protective mitigation measures on a case-by-case basis to authorized activities and travel management actions in known special status plant populations to prevent habitat loss and plant mortality. Adverse impacts would occur from projects that are not adequately mitigated. Alternative D closes critical habitat for the desert yellowhead to motorized and mechanized travel, which would result in a greater beneficial impact than Alternative A. Alternative D would result in greater beneficial impacts than Alternative C, which includes less restrictive protections for special status plants, and fewer beneficial impacts than Alternative B, which establishes habitat loss thresholds for all special status plant species and closes habitat to mineral, realty, and vehicle travel.

Alternative D allows chemical vegetative treatments in BLM sensitive plant populations so long as they would benefit the population. In most cases, chemical applications will be limited to the treatment of weeds or INNS that could crowd out BLM sensitive plant species in the plant community.

Alternative D requires on a case-by-case basis that surveys for BLM sensitive plant species be performed prior to authorizing activities. This action is the same as under Alternative A. Where surveys are required, this management would avoid adverse impacts in surveyed areas; however, for unsurveyed areas or areas for which there is no other useful information, plants or populations could be destroyed. Alternative D would result in greater beneficial impacts to special status plant species than Alternative C and fewer beneficial impacts than Alternative B.

4.4.7.3.5.2. Resources

Under Alternative D, cumulative short-term soil disturbance during the planning period would be expected to be approximately 53,894 acres, or slightly more than Alternative A but less than alternatives B and D. Cumulative long-term soil disturbance would be expected to be approximately 11,453 acres. Alternative D would result in much greater beneficial impacts than Alternative C in protecting special status plant habitats, fewer beneficial impacts than Alternative B, and almost the same beneficial impacts as Alternative A.

Alternative D closes non-WSA lands with wilderness characteristics in the Little Red Creek Complex to motorized travel and opens designated routes to mechanized travel. This would eliminate disturbance from motorized vehicles and reduce the impacts of mechanized travel because not all routes will be designated. Beneficial impacts to special status plants under Alternative D would be almost the same as under Alternative B and greater than under alternatives A and C.

To maintain forest health that can affect limber pine populations, Alternative D allows a full range of silviculture practices to treat disease and insect outbreaks on a case-by-case basis. Beneficial impacts to limber pine would result where treatments are conducted, but the level of beneficial impact would depend on how widespread the infestation is within the forest stand and the effectiveness of the treatment method. Forest stands not treated could experience a catastrophic loss of limber pine trees. Alternative D impacts would be very similar to impacts under alternatives A and C and more beneficial than under Alternative B, which does not aggressively address disease and insect outbreaks.

Approximately 1,000 acres of vegetative treatments will be performed each year by prescribed burning and mechanical methods under Alternative D. This is 200 more acres per year than alternatives A and C and 1,500 fewer acres per year than Alternative B. Of these 1,000 acres, 50 percent would be expected to be treated using prescribed fire. Alternative D includes the highest percentage of prescribed fire treatment acres of all the alternatives, and therefore would result in the greatest potential for adverse impacts from high-temperature fires. Mechanical treatments may have beneficial impacts by stimulating growth of special status plants or adverse impacts by removing plants or damaging habitats. The type and severity of impacts would be dependent on the plant species and the mechanical method utilized.

Under Alternative D, management of INNS is the same as Alternative B and less aggressive at treating the spread of INNS than alternatives A and C. Alternative D could require livestock flushing before livestock are allowed to graze on BLM-administered lands to prevent spreading ingested INNS seeds. Alternative D also allows for the adjustment of terms for any authorized activity believed to contribute to the spread of INNS. These additional management actions, together with ongoing control methods, would be more beneficial to special status plant species than management under alternatives A and C.

Alternative D protects greater sage-grouse leks from surface-disturbing activities with a 0.6-mile buffer in the Core Area and ¼-mile buffer outside the Core Area. This combination of buffer distances represents 102,212 acres of special status plant habitat also protected. Acres protected under Alternative D are 3.6 percent more than under Alternative A, 0.4 percent more than under Alternative B, and 3.6 percent more than under Alternative C. Alternative D management of redundant roads and new road development in big game crucial winter range is the same as Alternative A, which addresses these issues on a case-by-case basis. Alternative D allows range improvements in big game crucial winter range when they are part of a grazing management strategy and project impacts could be mitigated. Alternative D would result in fewer beneficial impacts to special status plant species than Alternative B and more beneficial impacts than alternatives A and C.

Surface use protections for cultural, paleontological, and visual resources under Alternative D are more restrictive than under Alternative A, much more restrictive than under Alternative C, and less restrictive than under Alternative B. Closing sites to surface-disturbing activities or implementing protective buffers around the sites would result in greater beneficial impacts to special status plant habitat. Alternative D designates more acres as VRM Class II than alternatives A and C, which means these areas would be subject to greater restrictions on surface-disturbing activities, and therefore providing greater protection for special status plants.

4.4.7.3.5.3. Resource Uses

Compared to alternatives A and C, Alternative D opens fewer acres to mineral exploration and development activities that could result in special status plant loss or habitat degradation. Closing lands to surface-disturbing activities reduces the risk of individual plants or entire communities being destroyed. Alternative D increases constraints on exploration and development of locatable and leasable minerals and mineral material disposals for the purpose of protecting other resource values, including special status plant communities. Actions associated with these activities on BLM-administered lands during the planning period would be expected to produce approximately 20,302 acres of short-term disturbance, which would be 5 percent less than Alternative A, 23 percent more than Alternative B, and 5 percent less than Alternative C. Long-term disturbance would be approximately 9,395 acres, which would be 5 percent less than Alternative A, 21 percent more than Alternative B, and 5 percent less than Alternative C.

Alternative D opens 459,720 acres (19 percent of the planning area) to wind-energy development, which is substantially fewer acres than alternatives A and C and more acres than Alternative B. Similarly, Alternative D opens 22 percent of the planning area to ROWs and manages more acres as ROW exclusion or avoidance areas (972,794 acres and 961,696 acres, respectively) than alternatives A and C. Alternative D designates utility corridors on 53,599 acres, or a decrease of approximately 25 percent from Alternative C and an increase of approximately 2 percent over Alternative B. Alternative D would result in less risk of potential surface disturbance from wind energy and ROW development that could adversely impact special status plant habitats than alternatives A and C and a greater risk than Alternative B.

Alternative D allows livestock grazing on 2,318,621 acres (97 percent of the planning area), which is 6,313 fewer acres than Alternative A, 6,313 fewer acres than Alternative C, and 6,526 more acres than Alternative B. However, like Alternative C, Alternative D prescribes a more intensive use of infrastructure and allows for moderate (41 to 60 percent) utilization when combined with a Comprehensive Grazing Strategy. Alternative D allows range improvement projects in BLM sensitive plant habitat with buffers of sufficient size to ensure protection from grazing impacts, however impacts from increased grazing utilization may occur outside the buffered area. Impacts from these actions would be slightly more beneficial than management under alternatives A and C and less beneficial than management under Alternative B. Alternative D would result in more beneficial impacts to special status plants than alternatives A and C, but more adverse impacts than Alternative B, which requires lighter utilization levels and uses fewer range improvements to manage livestock.

Alternative D impacts to special status plants from recreation management would be the same as under Alternative B, except that SRMAs would constitute 12,642 fewer acres and distinct ERMAs would constitute 573,753 fewer acres under Alternative D. Mineral, realty, and travel management in these areas will be more constrained than under alternatives A and C, which would have beneficial impacts on special status plant habitats by reducing surface-disturbing activities that could result in plant loss and habitat fragmentation. Alternative D would result in greater beneficial impacts to special status plants than alternatives A and C and fewer adverse impacts than Alternative B.

Travel management under Alternative D closes 25,425 acres (1 percent of the planning area) to motorized travel, an increase over alternatives A and C of 19,502 and 19,953 acres, respectively, and a decrease of 46,336 acres from Alternative B. Alternative D designates open roads and trails on 154,912 acres (6 percent of the planning area), a decrease of 1 percent from Alternative A and 2 percent from Alternative B, but an increase of 4 percent over Alternative C. Alternative D would result in less potential for adverse impacts to special status plants from plant loss and habitat fragmentation than alternatives A and C and a greater potential than Alternative B. Under all alternatives, most of the planning area will be open to existing roads and trails and impacts would be the same as described for Alternative A.

4.4.7.3.5.4. Special Designations

Alternative D designates 290,720 acres for special management, including ACECs, Congressionally Designated Trails, WSRs, and WSAs. None of these areas are designated specifically for the protection of special status plants, but special management that limits surface disturbance would have beneficial impacts on plants occupying the same area. Alternative D retains or expands ACEC protections for several of the areas designated under Alternative A. Constraints on resource uses related to mineral, realty, and travel management authorizations to protect the resource(s) for which the areas were designated would also protect special status plant habitats. Alternative D establishes the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area to protect greater sage-grouse habitat; this would also afford protection for special status plants in the area. Alternative D is less restrictive than Alternative B, but more restrictive than Alternative A. Alternative D would decrease the likelihood of disturbance to special status plant habitat that could occur under Alternative C, which does not designate any ACECs.

4.4.8. Special Status Species – Fish

The special status fish species addressed in this section include Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), a BLM sensitive species found in the planning area in the headwaters of the Wind River, and pallid sturgeon (*Scaphirhynchus albus*), a federally listed species found in downstream riverine habitats of the Platte River system. The sturgeon is considered in this analysis because its habitat could be affected by water depletions in the Sweetwater River watershed that flows into the Platte River system.

This analysis briefly considers impacts to sauger (*Stizostedion canadense*) and burbot (*Lota lota*). Neither of these species is on the BLM sensitive species list; however, the WGFD considers these species of special concern and actions on BLM-administered lands could impact these species in a few localized areas. Actions that alter water quality or quantity in or upstream of the Wind River, Popo Agie River, and Boysen Reservoir could impact sauger. Actions that alter water quality or quantity in or upstream of Torrey Creek, the Wind River (particularly near Jakey's Fork), the Popo Agie River, or Boysen Reservoir could impact burbot.

4.4.8.1. Summary of Impacts

Direct impacts to special status fish and their habitats result from activities that generate soil erosion and can increase sediment into waterbodies that support these species. Both the amount of vegetative cover along stream banks, which helps regulate water temperatures, and vehicles in the stream channel can directly impact habitat. Alternative B provides the greatest protection from surface-disturbing activities and would result in the greatest beneficial impacts to special status fish species. Alternative C provides the least amount of protection and would result in the greatest potential for adverse impacts to special status fish. Alternative D is similar in many respects to Alternative A, but Alternative D increases protection in areas important for other resources, particularly in special designation areas.

Adverse impacts to pallid sturgeon from actions that could result in potential water depletions in the Platte River system from oil and gas development and range improvement projects are expected to be the greatest in Alternative C, followed by alternatives A then D, with Alternative B having the least amount of potential.

4.4.8.2. Methods and Assumptions

As described in the *Fish and Wildlife Resources – Fish* section, management actions or resource uses that contribute to a decrease in abundance or distribution of special status fish species are considered adverse. Conversely, management actions or measures that protect these fish species from disturbance, improve habitat, or lead to increased population or viability are considered beneficial.

For purposes of this analysis, direct impacts are those that cause damage, loss, or decline in special status fish populations or loss of habitat or habitat quality. Direct impacts can occur from recreational use, toxicity from chemical contamination, or sedimentation. Indirect impacts can include the loss of suitable habitat for future occupation or reproduction. Conversely, an action that aides in the protection of suitable habitat can be also considered an indirect beneficial impact.

This analysis considers short-term impacts to special status fish species as those that contribute to a decline in abundance or distribution within 5 years of an activity or management action, and long-term impacts as those that do not manifest themselves until more than 5 years after an activity or management action.

Methods and assumptions used in this impact analysis include the following:

- Impacts to special status fish species and their habitats will be more important than impacts to common species.
- Activities that cause substantial disturbance to soils and vegetation can adversely impact water quality and quantity, which adversely impacts special status fish habitats.
- Surface disturbances accelerate runoff and sediment delivery to stream channels, which alters streamflows and reduces habitat quality for special status fish.
- Increased sedimentation can adversely impact special status fish species in the planning area; therefore, this analysis focuses on the degree of surface disturbance anticipated to occur under each alternative.
- For Platte River System species, the area evaluated includes the portion of the planning area hydrologically connected and drained by the Sweetwater River, and areas of the Platte River System downstream of the planning area.
- Water consumption in the Sweetwater watershed could adversely affect surface water quantity in the larger Platte River System. Water depletion analyses are based on the assumption that all water used for drilling and completion of wells, and evaporation from reservoirs and water tanks within the Sweetwater watershed contribute to surface flows of the Platte River or its tributaries.
- The numbers of projected oil and gas wells within the Sweetwater watershed varies by alternative and are estimated based on the potential for oil and gas development within the watershed. Water depletions are calculated using an average of 2 acre-feet per well.
- The addition, timing, and temperature of CBNG produced water will be controlled to prevent adverse impacts to special status fish and/or aquatic life.
- Each livestock well or spring maintains an average of two stock troughs approximately 10 feet in diameter (79 square feet) each, for a per-project surface area of 157 square feet.
- Livestock pits and reservoirs average approximately 1 acre in surface area. Each livestock well or spring maintains an average of two stock troughs approximately 10 feet in diameter (79 square feet) each, for a per-project surface area of 157 square feet.
- In cooperation with the WGFD, the BLM will continue to manage fish species listed on the BLM Wyoming State Director's Sensitive Species List in accordance with BLM Manual

6840. During the planning period, fish species could be added to or removed from the BLM sensitive species list as additional data are collected and evaluated.

- The USFWS has jurisdiction over the management of threatened and endangered fish species. Actions that could affect ESA-listed species will be subject to appropriate ESA Section 7 consultation with the USFWS.
- During the planning period, the USFWS could list or delist fish species as threatened and endangered as additional data are collected and evaluated. Most species delisted or downgraded from proposed or candidate status will be included on the BLM sensitive species list.

4.4.8.3. Detailed Analysis of Alternatives

Management actions and resource uses that could impact special status fish species and their habitats include all surface-disturbing activities, grazing by livestock, wild horses, or native ungulates, chemical or hydrocarbon contamination of water resources, OHV use, fire management, and activities that deplete water supplies.

Conversely, resource uses prescribed under the alternatives that impact special status fish could, in turn, be limited by management actions that protect these special status fish species.

Special status fish occur in very limited areas in the planning area, specifically in the Dubois area and in Beaver Creek, which flows into the Little Wind River on the WRIR. Impacts to special status fish from management actions are almost the same as non-special status fish species and are not repeated here. See the *Fish and Wildlife Resources – Fish* section for the description of beneficial and adverse impacts by alternative.

4.4.8.3.1. Impacts Common to All Alternatives

Although the types of impacts to special status fish species under the alternatives would be similar, the intensity of impacts would be expected to vary by alternative. Impacts that result in a decline in abundance or distribution of special status fish species can generally be divided into two broad categories: (1) impacts associated with a change in water quality and (2) impacts associated with a change in water quantity. For this analysis, water quality is defined in terms of sediment loading, water temperature, and water chemistry. Water quantity is assumed to be average flows under natural conditions.

Development of oil and gas wells can impact surface and groundwater quantity through water use associated with well drilling and completion, as well as through surface discharge of produced water from CBNG wells. Discharge of CBNG produced water that would substantially alter temperature and/or turbidity of receiving waters could adversely impact the survival and reproductive potential of sauger in some systems. Any such alteration in water quality would be most critical during the May through June spawning and incubation period. The amount of water used for drilling and completion of wells, including water for dust abatement and other post-drilling activities, is relatively similar for most types of wells. Water used for well construction and completion is assumed to reduce the amount of water available for use in the Platte River downstream of the planning area. The volume of produced water from CBNG wells impacting surface and groundwater quantity depends on the amount of water discharged into surface waters, reinjected, or discharged into impoundments. The contribution of produced water from CBNG wells is anticipated to be negligible compared to projected water depletions.

Projected development of range improvement projects including water impoundments (reservoirs and pits), springs, and wells are anticipated to deplete water in the Sweetwater watershed that is part of the Platte River system. The size of impoundment, spring, and well development is the same in all alternatives, but the number of developments would vary by alternative. Reservoir evaporative loss calculations are based on 45 inches annual pan evaporation, average pan coefficient of .70, and annual average precipitation of 12.1 inches for the Sweetwater watershed. Potential water depletion for wildfire management is not included in depletion calculations due to the non-predictive nature of unplanned fire.

An integrated management approach will be used to achieve special status fish habitat objectives. In cooperation with partners, strategies will be developed and implemented to prevent the introduction and spread of aquatic invasive species, which can severely impact habitat by reducing food sources for fish and reducing oxygen levels in the water. Movement of water from one drainage to another will be avoided to prevent the transfer of aquatic invasive species and disease.

Road crossings of streams will be designed and located to minimize impacts to special status fish movement. Where feasible, existing road crossings identified as restricting fish passage will be modified to facilitate passage.

Impacts to special status fish species and habitat from air quality, geologic resources, cave and karst resources, and VRM would not vary by alternative. Wild-horse herds do not overlap areas supporting special status fish species and therefore would not cause any impacts to these species.

No lands identified for disposal contain special status fish habitat and there would be impacts under any of the alternatives. Any lands acquired that contain special status fish habitat would be a beneficial impact.

4.4.8.3.2. Alternative A

Impacts from management actions under Alternative A are almost identical to Alternative A impacts described for non-special status fish species. Specific to special status fish, activities that contribute sediment to waterbodies that support Yellowstone cutthroat trout, burbot, and sauger are authorized on a case-by-case basis. Excess sediment can suffocate fish eggs or impair production of macroinvertebrates needed by mature fish, therefore special status fish occupying areas where surface-disturbing activities and associated sedimentation are not authorized would be beneficially impacted.

It is estimated that approximately 148 conventional oil and gas wells, 107 CBNG wells, 15 reservoirs and pits, 15 springs, and 25 water wells could be potentially developed in the Sweetwater watershed during the 20 year planning period. These actions would result in approximately 516 acre-feet of water being depleted under Alternative A during the life of the plan that would affect downstream pallid sturgeon populations in the Platte River.

Fire retardant will not be aerially applied within 300 feet of waterbodies that support Yellowstone cutthroat trout, burbot, and sauger. Due to the difficulty in judging distance from the air and the possibility of chemical drift, there would be a risk of retardant getting into the water. The potential for adverse impacts would depend on the kinds and amounts of chemical used and the length of time of exposure.

4.4.8.3.3. Alternative B

Impacts from management actions under Alternative B are almost identical to Alternative B impacts described for non-special status fish species. Alternative B includes more restrictive management prescriptions than Alternative A for surface-disturbing activities in the Dubois area, the location of most of the habitat for special status fish in the planning area. Activities that contribute sediment to waterbodies containing Yellowstone cutthroat trout, burbot, and sauger are prohibited.

It is estimated that approximately 37 conventional oil and gas wells, 20 CBNG wells could be potentially developed in the Sweetwater watershed during the 20 year planning period. These actions would result in approximately 114 acre-feet of water being depleted under Alternative B during the life of the plan that would affect downstream pallid sturgeon populations in the Platte River. New range improvement water projects would not be developed in Alternative B therefore there would be no associated water depletion concerns. Not authorizing new range improvements that result in a water depletion in the Sweetwater watershed would beneficially impact pallid sturgeon downstream of the planning area.

Alternative B does not allow aerial or hand use of fire retardant within ¼ mile of waterbodies that support Yellowstone cutthroat trout, burbot, and sauger. Alternative B provides a greater distance of protection than Alternative A and would reduce the risk of chemical drift or leach into the water.

4.4.8.3.4. Alternative C

Impacts from management actions under Alternative C would be almost identical to Alternative C impacts described for non-special status fish species. Alternative C opens the Dubois area to mineral and realty development outside the WSAs, and includes the least restrictive prescriptions in special status fish habitats. Alternative C allows activities that result in soil erosion and sedimentation of waterbodies supporting Yellowstone cutthroat trout, burbot, and sauger unless excess sediment would cause fish mortality. Alternative C would result in more adverse impacts to special status fish than alternatives A and B.

It is estimated that approximately 153 conventional oil and gas wells, 111 CBNG wells, 15 reservoirs and pits, 18 springs, and 28 water wells could be potentially developed in the Sweetwater watershed during the 20 year planning period. These actions would result in approximately 535 acre-feet of water being depleted under Alternative C during the life of the plan that would affect downstream pallid sturgeon populations in the Platte River. Alternative C would result in more adverse impacts to pallid sturgeon downstream of the planning area than alternatives A and B.

Under Alternative C, fire retardant will not be aerially applied within 300 feet of waterbodies that support Yellowstone cutthroat trout, burbot, and sauger to prevent adverse impacts to these special status fish species. This action is the same as Alternative A and provides less protection than Alternative B.

4.4.8.3.5. Alternative D

Impacts to special status fish from management actions under Alternative D are almost identical to those impacts described for non-special status fish species identified in the *Fish and Wildlife Resources – Fish* section. Alternative D allows actions that result in the removal or depletion of water in fish-bearing streams, including in the Platte River System, unless the action would result in the loss of a sustainable fish population. Alternative D avoids activities that contribute sediment to waterbodies supporting Yellowstone cutthroat trout, burbot, and sauger unless additional sediment would not harm the species.

It is estimated that approximately 133 conventional oil and gas wells, 95 CBNG wells, 15 reservoirs and pits, 15 springs, and 25 water wells could be potentially developed in the Sweetwater watershed during the 20 year planning period. These actions would result in approximately 462 acre-feet of water being depleted under Alternative D during the life of the plan that would affect downstream pallid sturgeon populations in the Platte River. Alternative D would result in more adverse impacts to pallid sturgeon downstream of the planning area than Alternative B and less than alternatives A and C.

Fire retardant will not be aerially applied within 500 feet of waterbodies that support Yellowstone cutthroat trout, burbot, and sauger, increasing the distance by 200 feet over alternatives A and C and decreasing the distance by 820 feet from Alternative B.

Overall, Alternative D would result in fewer beneficial impacts to special status fish than Alternative B and greater beneficial impacts than alternatives A and C.

4.4.9. Special Status Species – Wildlife

Direct impacts to special status wildlife species result from the direct loss of important habitat or a key habitat feature such as a nest site or lek area, or from animal mortality. Special status wildlife species can also be directly disturbed by human activities, potentially causing them to abandon a nest, lek, or home range. Disturbance during sensitive periods (e.g., winter and breeding) leads to lower recruitment rates and higher mortalities, resulting in adverse impacts to the species. Direct impacts to special status wildlife species would also include mortality from such activities as vehicles, fence entanglements, or drowning.

Habitat loss and fragmentation result in adverse impacts to special status wildlife species. Habitat loss generally results in direct impacts to the individual or population immediately affected. The impacts of habitat fragmentation, however, operate indirectly through mechanisms such as population isolation (Saunders et al. 1991); edge effects, such as increased nest predation and parasitism (Paton 1994; Faaborg et al. 1995); INNS encroachment; and disruption of migration patterns.

Indirect impacts to special status wildlife species occur by changing habitat characteristics or quality, which can ultimately result in changes in migration patterns, habitat use, carrying capacity, and long-term population viability. Indirect impacts to habitats for special status wildlife species can also occur when specific actions change the habitat in a way that makes it unsuitable for future habitation. Disturbance impacts can range from short-term displacement and shifts in activities to long-term abandonment of home range (Miller et al. 1998; Yarmoloy et al. 1988; Connelly et al. 2000).

For purposes of this analysis, short-term impacts (up to 5 years) to special status wildlife species are activities to which an individual or species immediately respond, but do not impact species population viability. Long-term impacts (more than 5 years) are those that cause an individual or species to permanently abandon an area or that alter species population viability and survival.

An example of beneficial long-term impacts is restoration of habitat structure or health, or enhancement of forage base to improve populations of special status wildlife species over time.

4.4.9.1. Summary of Impacts

Authorized activities that disturb soil and remove vegetation and result in habitat loss, modification, or fragmentation impact special status wildlife species. Actions that affect breeding and birthing activities, cause direct mortality, or cause animals undue stress or energy expenditures also impact special status wildlife species. Alternative B provides the greatest protection from surface-disturbing activities and therefore would result in the greatest beneficial impacts to special status wildlife species and their habitats. Conversely, Alternative C is the least restrictive of surface-disturbing activities and provides the least amount of protection; therefore, Alternative C would result in the greatest potential for adverse impacts to special status wildlife species. Alternative D is similar in many respects to Alternative A, but Alternative D increases protection in areas important to special status and non-special status wildlife species, particularly in special designation areas.

4.4.9.2. Methods and Assumptions

Surface-disturbing activities and other actions that remove vegetation, disturb soil, and change habitat characteristics alter habitat quality and indirectly impact special status wildlife species. Indirect impacts also result from actions that can alter habitats to make them unsuitable for future habitation by special status wildlife species.

Methods and assumptions used in this impact analysis include the following:

- Impacts to special status wildlife species are based primarily on potential impacts to BLM-managed habitats.
- Ground-disturbing activities could lead to modification (beneficial or adverse) of habitat and/or loss or gain of individuals, depending on the amount of area disturbed, the species affected, and the location of the disturbance.
- Changes in habitat quality could lead to direct impacts and could cumulatively impact species survival.
- Impacts to special status wildlife species and their habitats are more important than impacts to common wildlife species.
- Precise quantitative estimates of impacts generally are not possible because the exact locations of future actions are unknown, population data for special status wildlife species are often lacking, or habitat types affected by surface-disturbing activities cannot be predicted.
- Actions that impact one species result in similar impacts to other species using the same habitats or areas.
- Measures to protect one species generally will result in long-term beneficial impacts to other species within that habitat.
- The more acreage of habitat protected, the greater the beneficial impact to the targeted species.
- Prohibiting surface disturbance or occupancy is more restrictive and provides more protection for special status wildlife species than avoiding surface disturbance or occupancy.
- Disturbance during sensitive periods adversely impacts special status wildlife species.
- Short- and long-term surface disturbance are assumed to occur in vegetation types in proportion to the availability of these vegetation types in the planning area. Impact acreage for vegetation types are not absolute, but serve as a relative comparison among alternatives.

- Removal of sagebrush habitat will result in long-term adverse impacts to sagebrush-obligate species.
- Management of sagebrush habitats follows the BLM National Sage-Grouse Habitat Conservation Strategy (BLM 2004a). Using these guidelines, greater sage-grouse serve as an indicator species for other sagebrush-obligate species.
- “Prohibiting” non-beneficial ground disturbance and disruptive activities in greater sage-grouse habitats provides a higher level of protection for greater sage-grouse than “avoiding” these activities.
- Fencing can be an obstacle and/or potential hazard to special status wildlife species.
- Changing or altering livestock grazing patterns could beneficially or adversely impact special status wildlife species habitat and its use.
- Mitigation success depends on specific protective measures and past results, and assumes that mitigation would be properly implemented.
- Public interest in special status species will likely increase due to concerns about loss of habitat from development activities that supports these species.
- No direct impacts to habitats for special status wildlife species downstream along the Platte River from activities in the planning area are expected. Changes in water quantity in the planning area will be the primary indirect impact of resource management actions on Platte River species.
- In cooperation with the WGFD, the BLM will continue to manage species on the BLM Wyoming State Director’s Sensitive Species List in accordance with BLM Manual 6840. During the planning period, species could be added or removed from the list as more data are collected and evaluated.
- During the planning period, the USFWS could list or delist special status wildlife species as threatened and endangered as more data are collected and evaluated. Most species delisted or downgraded from proposed or candidate status will be included on the BLM sensitive species list.
- The greater sage-grouse Core Area is equivalent to the Wyoming Sage-Grouse Implementation Team’s greater sage-grouse core population areas established by the Wyoming Governor.
- The impoundment of water in oil and gas activities or as part of range improvement projects could increase breeding habitat for mosquitoes that carry West Nile virus that is fatal to greater sage-grouse.

4.4.9.3. Detailed Analysis of Alternatives

Potential impacts to special status wildlife species would be similar under all alternatives, however, the intensity of impacts would vary by alternative. Impacts to special status wildlife species from program management; other resources, including vegetation, fire, wild horses, and cultural; and resource uses such as minerals, ROWs, recreation and travel management, and livestock grazing; and special designations, including ACECs, historic and scenic trails, and WSAs are described under individual alternatives. The *Fish and Wildlife Resources – Wildlife* section in Chapter 3 describes the various WGFD statutory wildlife categories into which special status wildlife species in the planning area fit, including trophy game, predatory animals, game birds, migratory game birds, and nongame species, including raptors, neotropical migrants, mammals, and amphibians. Because impacts occur in habitats that can be occupied by animals belonging to multiple statutory categories, impacts are addressed either by specific species, by the habitat type they occupy, or collectively, where appropriate. Special status wildlife species typically occur in grassland/shrubland, forest/woodland, or riparian-wetland habitats.

4.4.9.3.1. Impacts Common to All Alternatives

Potential impacts to special status wildlife species under each alternative would be similar to the impacts described in the *Fish and Wildlife Resources – Wildlife* section of this chapter. Adverse impacts to special status species and their habitats are usually of more concern than impacts to general wildlife because of the limited nature of their numbers, habitat, or unique threats. Special status wildlife species mortality, habitat loss, fragmentation, or modification, and/or population declines can contribute to BLM sensitive species becoming listed under the ESA, and ESA-listed species becoming more imperiled.

Special status wildlife species habitats would be lost, degraded, fragmented, reclaimed, protected, and enhanced by management actions and allowable uses under all alternatives, although the intensity of impacts would vary by alternative. As the acreage of surface disturbance and human activity level increase, the quality and quantity of special status wildlife species habitats would likely be reduced. Areas with numerous access roads and surface disturbances could result in loss of available habitat and avoidance of the area, disrupt use patterns, and alter or eliminate corridors that link crucial habitats. Because the precise location of surface disturbance under the alternatives is not known and because special status wildlife species can utilize more than one vegetation type, the degree of impact from surface disturbance is anticipated to be directly related to the amount of surface disturbance. Long-term surface disturbance could continue, even following reclamation. Although reclamation restores some habitats and reduces the acreage of long-term surface disturbance, the locations of permanent facilities (e.g., roads and well pads) adjacent to reclaimed areas can reduce the utility of the reclaimed habitat. For example, the higher the density of permanent facilities in an area, the more a habitat is fragmented, and the more adverse are anticipated impacts to special status wildlife species.

Both direct and indirect beneficial impacts to special status wildlife species would result from implementing restrictions that conserve different habitat types or from implementing seasonal protections from surface-disturbing and disruptive activities. Refer to Appendix T (p. 1535) for the anticipated acres of short-term and long-term surface disturbance from BLM actions over the planning period.

Resources

Under all alternatives, impacts to special status wildlife species from air quality, geologic resources, water resources, and visual resources management would not vary by alternative. Management that limits adverse impacts to these resources would result in a secondary beneficial impact to special status wildlife species. Management that changes water quantity in the Sweetwater River watershed may directly impact special status wildlife species occupying aquatic and/or riparian-wetland habitats in Nebraska. See the resource-specific sections of this chapter for further description of impacts from management actions by alternative. There are no alternative-specific management actions for cave and karst resources. To the extent that management is directed at protecting these resources, once identified, there would be a secondary beneficial impact to Townsend's big-eared bats and their habitat.

Soil

Under all alternatives, management actions that limit soil disturbance would have a beneficial impact on special status wildlife species. Actions that disturb soil and remove vegetation would adversely impact special status wildlife species unless the disturbance was conducted in conjunction with vegetative treatments designed to enhance habitat for a specific species. Surface disturbance is avoided on steep slopes, with the degree of slope varying by alternative. Avoiding disturbance on slopes would result in a secondary beneficial impact to special status wildlife by limiting the amount of habitat available for surface-disturbing activities. Disturbances in special status wildlife species habitats considered limited in the planning area (i.e., Townsend's big eared bat, peregrine falcon, mountain plover, pygmy rabbit, and Canada lynx) would result in more adverse impacts than disturbances in more abundant habitats. Depending on the intensity of the disturbance, time of year of disturbance, and the health condition of special status wildlife species using the habitats, reductions in habitat quality could result in short-term and long-term impacts. The longer reclamation takes to restore disturbed areas to usable habitat, the greater the adverse impact to special status wildlife species.

Lands with Wilderness Characteristics

Lands with wilderness characteristics support and have unfragmented habitats for grassland/shrubland, forest/woodland, and riparian-wetland obligate special status birds, mammals, and amphibians. These lands are located in the Dubois area and do not support suitable habitat for black-footed ferret, white-tailed prairie dog, pygmy rabbit, or swift fox; therefore, management actions for the identified lands would not impact those species.

Fire and Fuels

Fire can result in both direct and indirect and beneficial and adverse impacts to special status wildlife species and their habitats. Generally, the impacts to habitat are much greater than the impacts to resident animals. Short-term adverse impacts to resident species from fire include displacement, disruption of reproductive activities, and occasionally mortality. In general, fire adversely impacts special status wildlife species in forest/woodland habitats for a longer time than species in grassland/shrubland habitats because of the time it takes the site to return to predisturbance conditions. Loss of mature timber stands would result in long-term adverse impacts to Canada lynx, grizzly bear, northern goshawk, and long-eared myotis. Fire can impact birds when it occurs during the nesting season, killing chicks and destroying nests. Raptors such as ferruginous hawks, northern goshawk, and peregrine falcon can benefit from fire due to increased populations of small mammals and birds in response to vegetative changes after fire. In the short term, fire can reduce cover and habitat available for prey species.

Using fire as a habitat management tool in grassland/shrubland habitats could adversely impact special status wildlife species if desirable shrub and perennial grass stands were converted to annual grasses. Sagebrush requires a long time to achieve the size and height needed for nesting and security cover, particularly in low-precipitation areas. Greater sage-grouse, sagebrush-obligate songbirds, and pygmy rabbits generally would be the species most affected, either beneficially or adversely, by habitat modifications in grassland/shrubland habitats. Removing native vegetation with fire could open sites to INNS, which has little benefit to wildlife either as forage or cover. Fire that removes most of the sagebrush from the ecosystem could remove suitable habitat for greater sage-grouse and sagebrush-obligate neotropical migrants in the long term, but impacts would depend on the severity, size, and location of the fire. Fire also could beneficially impact sagebrush-obligate species because it can improve the age class diversity of sagebrush plants and increase the density and species composition of the herbaceous plant understory. Fuels treatment would help minimize the size of wildfires and adverse impacts to special status wildlife species, particularly in greater sage-grouse habitats.

Vegetation

Forest management actions to meet forest health objectives could result in habitat loss and fragmentation, displacement of animals, disturbance from noise, and increased vehicle traffic, as described in the *Fish and Wildlife Resources – Wildlife* section. Forest management activities impact grizzly bear, gray wolf, Canada lynx, northern goshawk, and long-eared myotis the most because these species require a timber overstory for seasonal habitats. Timber management activities could adversely impact Canada lynx by removing forest cover needed for foraging and denning habitat and needed by snowshoe hare, the main prey of lynx. Snowshoe hares can reach their highest densities in young, dense coniferous or coniferous-deciduous forests, or mature forests with a dense understory of shrubs, aspen, and/or conifers. Northern goshawks typically occupy large tracts of old-growth coniferous forests with dense canopy cover. Timber management actions that thin or alter suitable habitat could adversely impact the availability of nesting habitat. Timber harvest could result in an increase in roads and access into Canada lynx, grizzly bear, and northern goshawk habitats that could result in additional habitat loss or disturbance conflicts.

Management actions that promote a diverse mix of grasslands and shrublands would also promote a natural landscape and healthy special status wildlife species habitats. Reducing impacts to vegetation resources from surface disturbance would reduce adverse impacts to special status wildlife species habitats. Maintenance of contiguous habitat blocks, and the corridors between them, would have a beneficial impact on species that have large home ranges and depend on large areas of habitat to carry out their life history requirements (i.e., grizzly bear, gray wolf, Canada lynx, greater sage-grouse, raptors, and neotropical migrants). Corridors between habitat blocks are important for seasonal movements and to minimize conflicts with human activities such as hiking, fishing, and camping. Successful reclamation of surface disturbance is necessary to establish connectivity within previously fragmented habitats and to achieve and maintain ecosystem function.

Management focuses on maintaining sagebrush and understory diversity in greater sage-grouse and other sagebrush-obligate species' habitats unless vegetative treatments are needed to achieve habitat objectives. Similar to greater sage-grouse, Brewer’s sparrow, sage sparrow, sage thrasher, loggerhead shrike, and pygmy rabbit depend on sagebrush habitats. Except for pygmy rabbit, these species could occupy other shrubland habitats, particularly during the non-breeding season. Because greater sage-grouse is one of the largest and most visible special status bird species, they are typically used as an indicator species for other sagebrush-obligate birds and small mammals; therefore, management actions that protect greater sage-grouse habitat generally would have beneficial impacts on all sagebrush-obligate species.

Management of riparian-wetland areas to meet PFC and the Wyoming Standards for Healthy Rangelands would improve habitat conditions for a multitude of special status wildlife species, including trumpeter swan, bald eagle, white-faced ibis, long-billed curlew, yellow-billed cuckoo, greater sage-grouse, and amphibians (northern leopard frog, great basin spadefoot toad, boreal toad, and spotted frog). Actions that improve riparian-wetland PFC would improve habitats for special status wildlife species, especially via increases in the quantity and quality of riparian-wetland vegetation and insects. Management actions that maintain seeps, springs, wet meadows, and riparian-wetland vegetation in a functional and diverse condition would have beneficial impacts on all special status wildlife species, and greater sage-grouse in particular. Under all alternatives, riparian-wetland areas are protected from surface-disturbing activities, which would also have a beneficial impact on special status amphibians and their habitats.

Invasive Species and Pest Management

Impacts from the establishment and spread of INNS and the various treatment methods would be the same as identified in the *Fish and Wildlife Resources – Wildlife* section. Annual and perennial INNS occur primarily in grassland/shrubland and riparian-wetland habitats on public lands. INNS would impact special status wildlife species such as greater sage-grouse, sage thrasher, Brewer's sparrow, white-faced ibis, and amphibians the most because those species spend most of their time in these habitats. Cheatgrass is the most widespread INNS in the planning area and has the greatest potential to adversely impact greater sage-grouse habitats. Broad-spectrum insecticides are discouraged in greater sage-grouse brood-rearing areas to reduce the adverse impacts to non-targeted insects important for young grouse from such treatments. All alternatives identify and prioritize areas for treatment and manage activities that contribute to the establishment of weed infestations, ultimately benefitting special status wildlife species habitats. Impacts to special status wildlife from the presence of INNS or control methods would not vary by alternative.

Fish, Wildlife, and Special Status Species

In general, impacts to special status wildlife from surface disturbance would parallel the impacts to general wildlife. Actions that constrain surface-disturbing activities to protect fish, special status fish, and special status plants also would have a beneficial impact on habitats for special status wildlife. Amphibians and neotropical migrants are the species most likely to benefit from management actions that protect fish and special status fish, whereas actions that protect special status plants would result in beneficial impacts to wildlife in all statutory categories.

All alternatives require surfacing-disturbing activities and facilities to have the smallest footprint possible to minimize the impacts of habitat loss and fragmentation. Implementing, where appropriate, conservation measures, terms and conditions, and appropriate BMPs and reasonable and prudent measures in existing state programmatic biological opinions for the bald eagle, Canada lynx, gray wolf, black-footed ferret, and grizzly bear would minimize and mitigate adverse impacts from resource uses and activities. Actions that could affect federally listed wildlife species require consultation and coordination with the USFWS. Due to the number of special status wildlife species that have habitats in the Dubois area, lands in that area are a priority for management actions that beneficially impact these species.

A TLS is used to protect breeding and nesting special status wildlife, including raptors, mountain plover, and greater sage-grouse from surface-disturbing and disruptive activities. Under all alternatives, surface-disturbing and disruptive activities are prohibited within ¼ mile of mountain plover breeding and nesting habitat from April 10 to July 10 unless surveys indicate the absence of birds. A TLS is applied within 1 mile of an active bald eagle nest during the period February 1 to August 15 to protect nesting eagles. Occupied or undetermined greater sage-grouse leks are protected from surfacing-disturbing activities year-round, and the distance of protection from leks varies by alternative. In addition, identified winter concentration areas for greater sage-grouse are protected from surface-disturbing and disruptive activities from November 15 to April 30. Seasonal nesting limitations for raptors, mountain plover, and greater sage-grouse would have beneficial impacts on other special status birds nesting in the same area. All stipulations are subject to exception, modification, or waiver if conditions warrant and the BLM subsequently grants an exception, modification, or waiver.

Approximately 1,724,082 acres (72 percent of the planning area) are identified as greater sage-grouse Core Area; therefore, management actions that conserve, protect, and maintain habitat for greater sage-grouse are a priority in this area. Numerous management actions common to all alternatives from the BLM National Sage-Grouse Habitat Conservation Strategy would result in beneficial impacts to this species (BLM 2004a). Actions that maintain sagebrush and understory diversity in seasonal habitats, manage riparian-wetland habitats in a functional and diverse condition, and reduce infrastructure that can cause greater sage-grouse mortality (i.e., fences) or give predators an advantage (i.e., perching structures) would result in beneficial impacts to special status wildlife. Impacts to special status wildlife would be minimized through appropriate placement of facilities and projects and maintaining connectivity between large blocks of undisturbed habitat. Conservation of sagebrush habitat would not only result in beneficial impacts to greater sage-grouse, but also other sagebrush-obligate species such as the sage thrasher and sage sparrow.

Most of the planning area has been block-cleared by the USFWS for black-footed ferrets based on negative findings in previous surveys. Surface-disturbing activities could affect the suitability of large white-tailed prairie dog complexes to be considered as potential black-footed ferret reintroduction sites in block-cleared areas. Outside block-cleared areas, surveys for black-footed ferrets are performed prior to authorizing surface-disturbing activities. Surface-disturbing activities could result in beneficial impacts to white-tailed prairie dogs because they often move into disturbed sites that have suitable grass communities nearby.

Management actions that protect general wildlife species during sensitive periods would also have beneficial impacts on special status wildlife. All alternatives apply a TLS seasonally to protect other nesting raptors and in big game crucial winter range. Applying these stipulations also would protect other special status wildlife using these habitats at the same time.

Wild Horses

Wild horses compete directly for water, forage, and habitat and wild horse management would result in direct adverse impacts to the availability of forage and cover in grassland/shrubland and riparian-wetland habitats for special status wildlife and their prey. Grazing could reduce upland and riparian-wetland vegetative cover and structure, and forage quality and quantity, thereby reducing the suitability of these habitats for special status wildlife. Impacts to white-tailed prairie dogs, mountain plovers, and black-footed ferrets would be minor because habitats for these species contain little forage for wild horses; therefore, horses are not expected to spend much time in these habitats. A total of 517,293 acres of the greater sage-grouse Core Area overlaps wild horse herd areas, which constitutes 30 percent of the Core Area on public land in the planning area. Wild horse actions would not impact grizzly bear, Canada lynx, trumpeter swan, and peregrine falcon because habitats for these special status wildlife species do not overlap with wild horse herd management areas.

Cultural and Paleontological

Management actions for cultural and paleontological resources would indirectly protect special status wildlife habitat by restricting surface-disturbing activities, thus minimizing vegetation loss. The amount of habitat protected is commensurate with the number of acres protected for these resources. Authorized excavation of sites and cultural and paleontological inventories would cause localized, short-term disruption at the excavation sites. However, these actions are subject to the same seasonal and surface use restrictions required for resource uses. Adverse impacts from cultural and paleontological surface disturbance would be expected in relatively small areas and would not vary among the alternatives.

Resource Uses

Minerals

Impacts to special status wildlife from mineral exploration, development, and transport would be the same as impacts described in the *Fish and Wildlife Resources – Wildlife* section. There would be no beneficial impacts to special status wildlife associated with locatable mineral, leasable mineral, and mineral materials disposal activities. Primary adverse impacts would be the short-term and long-term loss and fragmentation of habitat, animal displacement and/or mortality, and the disruption of corridors that link seasonal ranges. Under all alternatives, 3,432 acres are withdrawn from locatable mineral entry in the East Fork area. These acres were withdrawn pre-FLPMA, therefore the withdrawal is not subject to expiration. This withdrawal would benefit special status wildlife using the lands. It is anticipated that approximately 183 acres of long-term disturbance would occur each year from locatable mineral activities and another 183 acres of long-term disturbance would occur from mineral materials disposal activities under all alternatives. Geothermal and oil and gas development utilize the same extraction methods; therefore, impacts from the development of these resources would be similar. The number of acres with long-term impacts from disturbance would vary by alternative for oil and gas leasing activities; no additional disturbance would be expected from geothermal leasing activities under any of the alternatives because of the lack of identified commercially viable resources in the planning area.

Most concentrated oil and gas development is expected to occur in areas with high to moderate development potential in the Lysite and Beaver Creek areas and in the area south of Jeffrey City. Development activities would impact greater sage-grouse, mountain plover, white-tailed prairie dog, ferruginous hawk, burrowing owl, pygmy rabbit, dwarf shrew, and neotropical migrants. The Lysite and Beaver Creek areas are outside the greater sage-grouse Core Area, but the area south of Jeffrey City is in the Core Area due to the high density of greater sage-grouse leks. The rest of the planning area has low, very low, or no potential for oil and gas development, including CBNG. It is expected that oil and gas development in areas outside those with high and moderate potential would consist of wildcat operations and small isolated fields, and that there would be no large-scale development in those areas.

Adverse impacts from habitat loss, fragmentation, and modification can lead to population declines for specific species. Areas with intensive development, either from one or a combination of minerals extraction methods, could make surrounding undisturbed habitats unusable due to noise, human activity, roads, etc. Management actions that minimize surface-disturbing and disruptive activities in special status wildlife habitats would result in the fewest adverse impacts. Mineral extraction methods would determine the degree of adverse impacts to special status wildlife and associated habitat. Impacts would include displacement and disturbance of animals, removal of vegetation, and loss of habitat. The level of impacts would depend on the size of the exploration and/or development area and the importance of the altered habitat to the species. Because of the length of time it takes sagebrush to establish on sites that have been disturbed, all acres disturbed and reclaimed would be considered long-term disturbance impacts to sagebrush-obligate special status wildlife.

Mineral development and associated ROWs are expected to be the greatest single contributor to the disturbance of special status wildlife habitat in the planning area. Beyond initial exploration (including geophysical activities), land clearing, and aboveground facility construction, continued human disturbance to special status wildlife could occur from activities such as equipment maintenance and site operations, which are especially disruptive during sensitive times (wintering, breeding, and nesting). The management of disruptive activities during O&M activities varies by alternative.

Mosquitoes can breed in condensate pits used for drilling activities and evaporation ponds built for produced water. Mosquitoes carrying the West Nile virus can transmit the disease to greater sage-grouse, which results in the death of the bird.

Geophysical activities to identify oil and gas reserves can result in short-term disturbance and habitat modification impacts to special status wildlife. See the *Fish and Wildlife Resources – Wildlife* section for a description of impacts associated with seismic operations. Impacts from seismic operations would not vary by alternative; however, the number of acres open to geophysical activities does vary by alternative.

The development of phosphate leases would require stripping of the overburden to access the phosphate deposit, which would result in long-term, and likely permanent, loss of habitat for special status wildlife. Approximately 60,374 acres of federal mineral estate have been identified as having phosphate potential in the planning area, with deposits found predominantly along the Lander Slope, in the Sheep and Schoettlin Mountain areas, and near the Sweetwater River. These areas support many special status wildlife species, including sagebrush- and riparian-wetland-obligate birds, mammals, and amphibians. All alternatives prohibit phosphate leasing within 500 feet of riparian-wetland habitats, which would result in beneficial impacts to species utilizing these habitats. There are currently no phosphate leases in the planning area.

Lands

Land acquisitions, pursuit of easements, and tenure adjustments would improve management of the public lands overall; impacts to special status wildlife would be project specific and would vary depending on the type of tenure action. Lands containing important special status wildlife habitats are considered when making land tenure adjustments in the planning area. The acquisition of lands would have a direct beneficial impact to all species of wildlife associated with that habitat because lands under BLM control will not be available for subdivision and are subject to management decisions that consider impacts to all wildlife. Land exchange and acquisition could provide opportunities to make a more manageable land pattern that could be administered to benefit special status wildlife. Disposing of lands could result in the long-term loss of habitat, depending on how the new owner uses the lands. Lands with habitats for ESA-listed species are not available for disposal.

Renewable Energy

It is expected that wind-energy development would not occur universally across the planning area and would occur only in areas identified as having high potential for wind-energy development. Potential wind-energy development would include site development, utility corridors, and access routes and would result in direct adverse impacts to special status wildlife and their habitats. Due to the large footprints they create, wind-energy developments can cause habitat loss and fragmentation, wildlife avoidance of the area, and increased human activity which would result in long-term adverse impacts. Turbines and associated powerlines may adversely impact special status birds and bats because they can be struck by the turbine blades or suffer internal injuries and mortality from rapid air pressure changes. There would be no direct beneficial impacts to special status wildlife from wind-energy development.

ROWs and Corridors

Impacts to special status wildlife from ROWs and corridors would be the same as described in the *Fish and Wildlife Resources – Wildlife* section. Concentration of aboveground and belowground utilities in corridors would result in barriers, either physical or psychological, to special status wildlife movement. Increased traffic along these routes could increase the risk of vehicle-related wildlife mortality. Facilities that produce continual noise can affect the breeding vocalizations of greater sage-grouse. Continuous noise from industrial facilities, such as compressor stations, close to active greater sage-grouse leks would interfere with male greater sage-grouse strutting behavior which could reduce the reproductive success of greater sage-grouse using these leks.

Livestock Grazing Management

All alternatives allow livestock grazing across most of the planning area, which would result in direct competition with special status wildlife for forage and habitat. The development of livestock grazing systems would provide the opportunity to improve or maintain range conditions that support special status wildlife. Management of BLM-administered lands to meet Wyoming Standards for Healthy Rangelands (Appendix J (p. 1437)) would result in actions that could balance the impacts of grazing while sustaining special status wildlife and their habitat. Failure to implement proper livestock grazing management could degrade habitats if removal of vegetation is excessive, soil disturbance and compaction, and the transport of INNS. Livestock allowed to concentrate in riparian-wetland areas could adversely affect habitat for special status wildlife by removing hiding cover and degrading water quality and quantity. Livestock grazing managed for light utilization and authorized outside sensitive periods would reduce or eliminate potential conflicts and be the most beneficial for special status wildlife and their habitats. High utilization levels in riparian-wetland and upland habitats would reduce available forage and cover for special status wildlife and could cause a decline in plant diversity, which could result in a decline in the number of species the area can support.

Placement of new water sources or salt or mineral supplements in greater sage-grouse breeding and nesting habitat could degrade habitat quality by increasing forage utilization and reducing cover needed to conceal nests and chicks. Livestock grazing in fall or early spring would likely remove the residual herbaceous understory and reduce its vertical structure, which would reduce the visual security for upland nesting special status birds such as greater sage-grouse, sage thrasher, and Brewer's sparrow. Inadequate security cover could lead to increased predation and subsequent lower nesting success. Under all alternatives, forage utilization levels are established in greater sage-grouse nesting habitat to ensure the availability of adequate nesting cover.

Livestock range improvement projects, such as fences and water developments designed to alter grazing distribution and expand use into areas under-utilized by livestock, will both adversely and beneficially impact special status wildlife. Areas that receive less livestock use are often favored by special status wildlife due to ample forage and cover, reduced competition for resources, and limited human disturbance associated with grazing management activities. Range improvements modify natural livestock movement patterns and could lead to increased plant harvest in breeding, nesting, and winter habitats essential for special status wildlife. Projects can also alter grazing distribution to increase nesting cover in areas that previously received high utilization levels. Livestock fences create travel barriers to grizzly bear and gray wolf and impalement hazards to birds. Management actions that consider placement and visibility of fences in relation to special status wildlife seasonal habitats and movement patterns would beneficially impact the species.

Water developments maintained throughout the year can be beneficial to special status wildlife in areas where other water sources are limited. Well-designed reservoirs and associated riparian-wetland vegetation could create nesting, feeding, and brood-rearing habitat for migratory birds. Water troughs provide water in very arid areas, but also can pose a drowning hazard to birds trying to access water. Associated windmills and/or power poles provide hunting perches for raptors, which could result in predation of special status wildlife such as greater sage-grouse and mountain plover. Similar to pits and ponds used in mineral development activities, shallow or stagnant livestock water can produce mosquitoes that carry the West Nile virus. Mosquitoes carrying the West Nile virus can transmit the disease to greater sage-grouse, and if exposed, the bird would die. Water developments increase livestock use in areas that could have been used predominantly by wildlife. Wildlife tend to depend on areas where there is little livestock use because they do not have to compete for forage and cover resources. Increasing livestock use in these areas could lead to increased plant utilization, resulting in decreased forage and cover and dispersal of special status wildlife. Livestock use around water sources could also alter vegetative diversity, potentially reducing habitat quality for many species of special status wildlife.

Recreation and Travel

Impacts to special status wildlife from recreation and travel management actions would be the same as described in the *Fish and Wildlife Resources – Wildlife* section. Recreation activities during sensitive periods (breeding, nesting, birthing, wintering, and hibernating) could disrupt special status wildlife behavior and cause the expenditure of energy reserves, resulting in adverse impacts to the individual or the local population. OHV use can cause short-term displacement and long-term habitat loss and fragmentation, including expanding human presence into formerly remote areas. Impacts would increase if frequent OHV use occurs during critical periods for special status wildlife, potentially leading to decreased health, death to individuals, or overall population declines. Areas closed to motorized vehicle use would beneficially impact special status wildlife by eliminating habitat loss caused by roads and reducing disturbance or mortality from vehicles. Special status wildlife use in and around developed recreation sites is typically limited because wildlife generally avoid areas with human activity/presence. Lands managed for primitive recreation experiences protect the natural environment, and therefore also would beneficially impact special status wildlife.

Special Designations

Special designation areas that have restrictions on surface-disturbing activities and resource uses that adversely impact special status wildlife would result in long-term beneficial impacts to the species. ACEC designations would result in beneficial impacts to special status wildlife species by restricting surface-disturbing activities and certain resource uses, such as mineral development, ROW development, and motorized vehicle use. Each ACEC has its own set of prescriptions for how lands are managed. The only prescription that automatically comes with the ACEC designation is the requirement that a Plan of Operations be completed before locatable mineral exploration or development can occur, regardless of acreage. This requirement allows the BLM an opportunity to identify and address potential impacts to wildlife with the mining proponent; however, the 1872 General Mining Law gives preference to the mining proponent over the protection of wildlife habitat. Special status wildlife habitat adjacent to NHTs is also protected from development; however, the distance from the NHTs that the protection would extend varies among the alternatives. The *Special Designations* section of this chapter provides further analysis for each special designation by alternative. Eight WSAs, encompassing 55,338 acres, are managed for naturalness, outstanding opportunities for solitude, and primitive and unconfined recreation under the IMP for Lands under Wilderness Review. Impacts to special status wildlife would not vary by alternative, except for road and trail closure areas, which are discussed in the *Comprehensive Trails and Travel Management* section of this chapter. Habitats in WSAs are protected from surface-disturbing activities in the long term, and short-term disruptive activities are minimized. Approximately 21 miles of NWSRS-eligible waterway segments along Baldwin Creek and the Sweetwater River provide habitat for special status wildlife occupying riparian-wetland, grassland/shrubland, and forest/woodland plant communities. These special designations provide multiple beneficial impacts by restricting activities and resource uses that degrade habitat and disturb special status species wildlife.

4.4.9.3.2. Alternative A

4.4.9.3.2.1. Program Management

Alternative A requires surveys on a case-by-case basis to determine the presence or absence of BLM sensitive species prior to authorizing actions on public land. If species are present, mitigation measures are required to protect the species and limit adverse impacts to their habitats. The requirement for surveys is based on the availability of suitable habitat in the project area. Surveys for nongame neotropical migrants, mammals, and amphibians are generally not required before authorizing surface-disturbing activities, whereas surveys for special status raptors, greater sage-grouse, white-tailed prairie dog, and pygmy rabbit are generally required. In all cases, surveys are required for threatened and endangered species in suitable habitat. Information collected during surveys will help in determining appropriate mitigation measures to protect species during sensitive periods (winter, mating, nesting, hibernation), protect limited habitats, and contribute to species occurrence knowledge in the planning area for future authorizations. Alternative A establishes limits of acceptable habitat loss on a case-by-case basis to reduce declines in special status wildlife populations. These management actions would beneficially impact special status wildlife.

Alternative A applies a TLS to prohibit surface-disturbing activities within ¾ mile of active peregrine falcon, northern goshawk, burrowing owl, and ferruginous hawk nests from February 1 to July 31. This date range would adequately protect nesting and fledging ferruginous hawks and peregrine falcons because they typically finish these activities between those dates. Ferruginous hawks tend to be more sensitive to disturbance, and a ¾-mile buffer might not be adequate to prevent nesting birds from abandoning eggs or chicks. Northern goshawks and burrowing owls usually initiate nests later in spring; therefore, their chicks generally do not fledge until after July 31. Alternative A would result in long-term adverse impacts to northern goshawks and burrowing owls because the date range would not be long enough to encompass chick fledging. Protective buffers would help minimize, but would not completely prevent, impacts to raptors because most species are mobile beyond these buffers. Impacts from habitat degradation and loss would be commensurate with the amount of surface disturbance. Areas expected to experience a large amount of surface disturbance are associated with intensive oil and gas development and uranium mining in the Lysite, Gas Hills, Beaver Creek, and south of Jeffrey City areas.

Alternative A includes a number of management actions directed specifically at protecting greater sage-grouse and their habitat. Surface-disturbing and disruptive activities are prohibited on or within ¼ mile of occupied greater sage-grouse leks. Greater sage-grouse have a high fidelity to breeding areas; therefore, protecting leks and surrounding nesting habitat would ensure long-term availability of these sites for greater sage-grouse and for other sagebrush-obligate neotropical migrants. Disruptive activities occurring on or near leks can cause greater sage-grouse to leave the lek and can result in lower reproduction rates and subsequent population declines for that particular area. Alternative A will avoid disruptive human or noise activities within ¼ mile of the perimeter of occupied leks between 8 p.m. and 8 a.m. from March 1 to May 15 on a case-by-case basis. Disruptive activities include actions such as non-emergency project maintenance, road blading, project staking, and resource inventories. Alternative A avoids surface-disturbing and disruptive activities in greater sage-grouse nesting habitat within 2 miles of occupied leks from February 1 to July 31. This action would result in short-term beneficial impacts to nesting birds, but would not protect habitats in the long term because Alternative A allows surface-disturbing activities in this same area outside the nesting season. This action would provide long-term protection of 16,283 acres of lek habitat and short-term protection of 794,452 acres of nesting habitat on public surface. Alternative A does not establish disturbance densities or cumulative surface disturbance thresholds in greater sage-grouse breeding, nesting, and brood-rearing habitat, which could adversely impact the ability to maintain existing populations.

On a case-by-case basis, Alternative A requires equipment or techniques that reduce the noise decibel output to be installed on facilities such as compressor stations to minimize the impacts of noise to breeding and nesting greater sage-grouse. Noise levels that interfere with greater sage-grouse vocalizations can adversely impact the reproductive success of males. This management action, if applied, would beneficially impact greater sage-grouse using leks close to noise sources. High-profile structures that can be used by raptors as hunting perches are prohibited within greater sage-grouse nesting habitats on a case-by-case basis. Greater sage-grouse are susceptible to predation during breeding and nesting periods and structures that give raptors a hunting advantage could contribute to a population decline. In addition to greater sage-grouse, overhead structures can increase raptor predation on white-tailed prairie dogs, mountain plovers, and pygmy rabbits. Alternative A allows, on a case-by-case basis, overhead powerlines in greater sage-grouse, white-tailed prairie dog, mountain plover, and pygmy rabbit habitats. To reduce predation opportunities, Alternative A requires on a case-by-case basis that anti-perching devices be installed on overhead powerlines and that low voltage powerlines be buried. Reducing noise and predation opportunities would beneficially impact special status wildlife.

Alternative A avoids surface-disturbing activities in occupied pygmy rabbit and white-tailed prairie dog colonies when possible. Pygmy rabbits typically spend most of their time within approximately 100 feet of their burrows; therefore, projects should be able to avoid these habitats in most cases. Surface disturbance in white-tailed prairie dog colonies can adversely and beneficially impact the species and black-footed ferrets can also live in these colonies. Blading and trenching activities could cause animal displacement from the area, loss of burrow habitat, or animal death. These actions also would disturb soil, which could facilitate additional burrow development because white-tailed prairie dogs will utilize the softer disturbed ground to dig new burrows and pathways.

To protect special status bats, Alternative A avoids surface-disturbing and disruptive activities at or near known bat maternity roosts and hibernation areas on a case-by-case basis. These habitats are typically found in old mining shafts and adits in the South Pass and Bridger Mountain areas, in dilapidated buildings, and in trees throughout the planning area. To birth their young, bats require warm, safe places close to good insect foraging areas and they hibernate in areas where they are less likely to be disturbed by light, noise, and predators. Disturbance during the hibernation period can cause bats to use up fat reserves needed to survive the winter months. Disturbance of maternity roosts, hibernacula, or adjacent foraging habitats can result in localized bat population declines.

As travel corridors for special status wildlife are identified, Alternative A manages surface disturbance and the placement of facilities to minimize adverse impacts to movement on a case-by-case basis. Movement corridors are necessary for special status wildlife to access seasonal habitats and to maintain genetic diversity within the population. Telemetry data collected indicates species such as Canada lynx, grizzly bear, and greater sage-grouse tend to utilize the same areas each year to move between seasonal habitats. Lynx Analysis Units (LAUs) have been established to identify important transition ranges with Canada lynx habitats occurring on adjacent USFS lands. Preserving these corridors would result in long-term beneficial impacts to special status wildlife.

Many special status wildlife species occupy lands in the Dubois area. Grizzly bear, gray wolf, Canada lynx, bald eagle, trumpeter swan, northern goshawk, white-faced ibis, spotted bat, and BLM sensitive amphibians occupy the area, and much of their individual habitats overlap. Alternative A closes the Whiskey Mountain and East Fork ACECs and the Whiskey Mountain and Dubois Badlands WSAs to most surface-disturbing activities, which would beneficially impact special status wildlife. The remainder of the Dubois area is open to surface-disturbing and disruptive activities and managed with standard stipulations, such as seasonal raptor nesting protections and riparian-wetland area avoidance. Standard stipulations would not protect most special status wildlife habitats from long-term loss or fragmentation resulting from authorized resource uses and could lead to localized population declines.

4.4.9.3.2.2. Resources

Lands with Wilderness Characteristics

Alternative A does not specifically manage lands with wilderness characteristics. Most of the identified lands with wilderness characteristics are in the Whiskey Mountain ACEC and are managed in accordance with ACEC prescriptions. Lands outside the ACEC are not subject to special management.

Fire and Fuels

Under Alternative A, it is anticipated that 300 acres per year would be treated through the use of prescribed fire and 500 acres would be treated using mechanical treatment methods to address fire and fuels concerns. Prescribed fire and mechanical treatments would beneficially and adversely impact special status wildlife. Fire that removes all timber and shrubs in habitats would result in long-term adverse impacts due to the length of time it takes for new timber or shrubs to grow. Fire that thins or creates mosaics in forest/woodland and grassland/shrubland habitats would likely beneficially impact special status wildlife that require a greater degree of plant diversity. Mechanical treatments can be performed with a greater degree of control than fire treatments; therefore, adverse impacts from mechanical treatments will likely be minor. Targeting mechanical treatments for habitat improvement would beneficially impact special status wildlife using the area.

Alternative A allows full suppression strategies, including surface-disturbing activities, for wildland fires on a case-by-case basis. Full fire suppression would beneficially impact special status wildlife by limiting the short-term and long-term loss of available habitat; however, suppression that includes the use of heavy equipment that removes topsoil can result in long-term loss of habitat. Vehicles and equipment that disturb soil can allow INNS to establish or spread on disturbed sites, which would reduce overall habitat quality. There would be fewer adverse impacts from surface disturbance if post-fire vegetative seeding was conducted and reclamation was successful. Fire suppression activities (e.g., vehicles, heavy equipment, pedestrians, and aircraft) could displace species sensitive to disturbance, such as roosting or nesting birds. Fire suppression activities could harm populations of amphibians if toxic fire-fighting chemicals are applied in riparian-wetland areas.

Vegetation

Alternative A manages forests and woodlands in response to forest health, demand for forest products, and habitat needs for special status wildlife using a variety of silviculture practices. Alternative A limits clear-cuts to 25 or fewer acres and prohibits them within 100 feet of riparian-wetland areas. Timber harvests that remove all the trees within a cut block can result in long-term loss of habitat for northern goshawk and Canada lynx, and short-term disturbance impacts from noise, displacement, and increased human presence. Prohibiting disturbance in riparian-wetland areas would result in a long-term beneficial impact to special status amphibians.

Alternative A manages forest insect and disease outbreaks on a case-by-case basis and forest/woodland areas prescribes planting in areas of product sales, vegetative treatments, or fire if natural regeneration does not occur. Timber stands lost from insects and disease would result in long-term adverse impacts to special status wildlife that depend on forest habitats. Treatment activities would result in short-term adverse impacts to special status wildlife; however, treatments also would result in long-term beneficial impacts by improving the overall quality of the habitat.

Alternative A manages grassland and shrubland habitats to achieve the vegetation attributes described in the NRCS Ecological Site Descriptions. This action could beneficially impact special status wildlife because site descriptions include a mixture of grasses, forbs, and shrubs that should provide adequate forage and security and thermal cover needed by most species. Ecological Site Descriptions typically prescribe a higher percentage of grasses in the plant community, which could adversely impact shrub-obligate species if shrub density declines. On a case-by-case basis, Alternative A allows soil and vegetative treatments used to increase rangeland forage production. Treatments focused on increasing herbaceous production and decreasing the amount of sagebrush in plant communities would adversely impact special status wildlife if treatments do not maintain a balance of herbaceous and woody species.

Alternative A prohibits surface-disturbing activities within 500 feet of water and riparian-wetland areas, which would conserve special status wildlife habitat and provide protection from impacts that can degrade these areas. Surface disturbance that generates additional sediment or changes the hydrologic function of the area can impact habitat quality and quantity for special status wildlife in the long term. The BLM will manage riparian-wetland areas to meet PFC and will utilize various site-specific management actions, such as upland water developments and riparian-wetland area pasture or exclusion fences, to move areas toward PFC where needed. Management actions such as developing water in upland habitats and building exclusion fences to eliminate concentrated grazing use in riparian-wetland areas could adversely and beneficially impact special status wildlife. Reducing grazing in riparian-wetland areas would increase grazing utilization in upland habitats used by greater sage-grouse; this could reduce standing herbaceous cover needed to conceal nests and chicks. Fences also could lead to altered movement patterns and could be a hazard to some species of birds flying to and from seasonal or foraging habitats. Prohibiting surface disturbance near riparian-wetland areas and utilizing tools to reduce grazing use would be expected to ultimately result in a riparian-wetland system with increased vegetation and structural diversity, which would lead to an increase in the abundance and diversity of special status wildlife the area can support.

Wild Horses

Impacts from wild horse management under Alternative A would be the same as described under *Impacts Common to All Alternatives* above. Alternative A does not specifically establish travel loops to facilitate wild horse viewing, and requires that fencing decisions for HMAs consider wild horse movement and genetic diversity. Limiting or modifying fences in HMAs would beneficially impact special status wildlife movement in the same area.

Cultural and Paleontological Resources

Alternative A protects cultural and paleontological resources in the Warm Springs Canyon Flume area, around sacred sites and TCPs, and in the Beaver Rim and Bison Basin areas from surface-disturbing activities. Management actions that prevent surface disturbance and subsequent habitat loss in these areas may result in beneficial impacts to special status wildlife species using these areas.

4.4.9.3.2.3. Resource Uses

Minerals

Alternative A manages most (99 percent) of the planning area as open to locatable mineral exploration and development; mining activities would adversely impact special status wildlife and their habitats. There is little opportunity under the 1872 General Mining Law to prevent or mitigate adverse impacts to special status wildlife other than ESA-listed species. Mining activities would result in the loss, fragmentation, and modification of predominantly grassland/shrubland and forest/woodland habitats, loss of nests and young, death of less mobile animals, and wildlife displacement and disturbance from equipment noise, vehicles, and human presence. The amount of habitat lost, fragmented, or altered would depend on the scale of the mining activity. Areas open to locatable mineral entry include 1,720,190 acres of the greater sage-grouse Core Area, which could result in short- and long-term adverse impacts to greater sage-grouse breeding, nesting, brood-rearing, and winter habitat by removing and fragmenting habitats and increasing human presence during sensitive periods. Development of large uranium deposits south of Jeffrey City would result in the loss of habitat for greater sage-grouse from surface disturbance and fragmentation.

Alternative A withdraws a total of 23,114 acres of federal mineral estate, and most withdrawals are subject to expiration after 20 years. Alternative A pursues existing withdrawals for extension at the end of the withdrawal period. Withdrawn acres are scattered throughout the planning area; however, most acres are associated with the Whiskey Mountain and East Fork ACECs. Lands within these ACECs provide habitat for a number of special status wildlife species, in addition to bighorn sheep and elk, and protecting this habitat from locatable mineral exploration and development would result in long-term beneficial impacts to the maintenance of populations of bald eagle, northern goshawk, Canada lynx, grizzly bear, gray wolf, and BLM-sensitive neotropical migrants. A total of 3,893 withdrawn acres are in the greater sage-grouse Core Area and 4,472 withdrawn acres are in LAUs. Withdrawn acres would result in long-term beneficial impacts to special status wildlife by preventing habitat loss and fragmentation from mining activities.

Alternative A opens 2,280,345 surface acres to geothermal leasing and opens 2,380,925 surface acres to oil and gas leasing (95 percent and 99 percent of the planning area, respectively). It is anticipated that approximately 770 acres would be disturbed each year through oil and gas development activities, with 400 acres being disturbed for the long term. The disturbance of these acres would adversely impact special status wildlife through the alteration of habitat. It is expected that most of the short-term acre disturbance would likely result in long-term impacts to sagebrush-obligate special status wildlife due to the length of time it takes to reestablish sagebrush on disturbed areas.

Alternative A impacts to special status wildlife from mineral lease exploration and development would be similar to those described for locatable mineral entry, except mineral leases are subject to surface use and timing stipulations for greater sage-grouse, raptors, and mountain plover. Timing limitations would protect these breeding and nesting species in the short term, but surface disturbance outside the stipulated period would result in habitat loss and fragmentation in these same habitats. Surface use stipulations prohibit surface disturbance within ¼ mile of occupied greater sage-grouse leks (16,283 acres), which would provide long-term protection on these acres.

Most development is expected to occur in areas with high and moderate potential for oil and gas resources that overlap habitat for greater sage-grouse, mountain plover, ferruginous hawk, burrowing owl, grassland/shrubland neotropical migrants, white-tailed prairie dog, pygmy rabbit, and swift fox. Surface disturbance would likely result in beneficial impacts to white-tailed prairie dogs and mountain plover utilizing adjacent habitats because these species typically inhabit newly disturbed areas. Large-scale development would result in greater levels of habitat loss and fragmentation because there would be more roads, pipelines, well sites, and powerlines than would be associated with wildcat wells or isolated small fields. Developments could adversely impact linkages between habitat patches needed to ensure connectivity of populations. Large-scale habitat loss and fragmentation, combined with the increased level of human presence, vehicles, and infrastructure, could cause special status wildlife to avoid the area; this would be a long-term adverse impact to special status wildlife.

Alternative A opens almost all the greater sage-grouse Core Area in the planning area to mineral leasing. Of the total acres in the Core Area (1,724,082 acres), Alternative A closes just 25,136 acres to mineral leasing. There is a moderate potential area for oil and gas south of Jeffrey City which, if developed, would result in the loss of habitat for greater sage-grouse, both from surface disturbance and from a high degree of fragmentation, which would likely cause population declines in this part of the Core Area.

Seasonal protections from surface-disturbing and disruptive activities do not apply to the O&M activities for oil and gas wells and facilities unless applied as a COA on the permit. Activities such as hydraulic fracturing ("fracking"), powerline reconstruction, range improvement repair, and road maintenance would not be subject to timing limitations to protect special status wildlife unless the action is specifically identified in the project analysis and added to the authorization. These types of activities can cause wildlife stress and disturbance to wildlife during the sensitive nesting period due to the length of time it takes to complete the work, the level of noise generated, and the presence of people and equipment. O&M activities would likely result in short-term adverse impacts related to animal displacement and long-term adverse impacts if the level of activity results in avoidance of the area or the loss of nests or young.

Alternative A open 22,754 acres and closes 4,268 acres to geothermal and oil and gas leasing in LAUs in the Dubois area. Large development projects are not anticipated in the Dubois area;

however, there could be exploration drilling. Exploratory drilling operations would result in long-term habitat loss and area avoidance by Canada lynx due to the length of time it would take to return sites to suitable habitat, and the secretive nature of the species.

Alternative A opens the entire planning area to geophysical activities, subject to COAs that could protect special status wildlife. Areas closed to mineral leasing would likely not be authorized for geophysical activities.

Alternative A opens a total of 2,240,104 acres (94 percent of the planning area) to phosphate leasing. It is expected that phosphate leasing and extraction could occur on approximately 42,291 acres identified as having potential for phosphate. Much of the area with phosphate potential overlaps the greater sage-grouse Core Area, and development of phosphate leases would result in long-term, if not permanent, habitat loss for greater sage-grouse and other sagebrush-obligate special status species. Of the total acres closed to phosphate leasing, 102,397 acres are in the Core Area, which is 6 percent of the total acres of the Core Area in the planning area. Leasing is open on 22,038 public surface acres of LAUs that also overlap habitat for grizzly bear, gray wolf, bald eagle, and neotropical migrants, but these lands are not identified as having phosphate potential. Therefore, no impacts to these species would be expected under Alternative A.

Alternative A opens 2,165,196 surface acres (90 percent of the planning area) to mineral materials disposals. Of these acres, 1,587,389 overlap the greater sage-grouse Core Area. Mineral materials disposals typically involve the removal of all surface material; therefore, there would be adverse impacts to special status wildlife using disposal sites, including white-tailed prairie dog and mountain plover (which tend to prefer disturbed sites), from the loss of habitat. Alternative A closes 229,014 acres to mineral materials disposal, which would result in long-term beneficial impacts to special status wildlife.

Lands

Land acquisition or disposal actions are conducted with the goal that the exchange, acquisition, or disposal will increase public benefits, including special status wildlife resources. Any acquisition of non-federal surface land that includes high value habitat can result in beneficial impacts by allowing for mitigation or restrictions on surface-disturbing and disruptive activities. Any disposal of BLM-administered land that contains high value habitat is typically avoided. Disposal lands could experience increased human presence, which could increase the disturbance to wildlife utilizing the area. All land tenure actions are analyzed site specifically, using a public process, to determine what is in the public interest. Consolidating land ownership through land tenure adjustments increases the manageability of lands and results in contiguous blocks of habitat, which would result in beneficial impacts to special status wildlife. Alternative A identifies 8,053 acres for disposal by sale, exchange, or other methods, and makes available an additional 1,475 acres with restrictions on future use. Restrictions would likely protect special status wildlife because they would ensure lands disposed of are used in a manner compatible with surrounding lands.

Renewable Energy

Alternative A opens 2,113,512 acres (88 percent of the planning area) to wind-energy development, consistent with the Wind Energy Programmatic EIS (BLM 2005a). Erecting wind turbines in special status wildlife habitat would create collision hazards for birds and can cause pulmonary bleeding in bats from air pressure changes near the rotating turbine blades. These impacts would result in the death of the affected animal and could cause localized population declines. Wind energy facilities could result in permanent habitat loss for special status wildlife because facilities would likely be permanent. The level of impact to local populations of special status wildlife would depend on where the development occurs and which special status wildlife habitats are affected. Alternative A manages wind-energy development in greater sage-grouse habitats on a case-by-case basis. Of the acres open to wind-energy development, 1,584,707 acres overlap the greater sage-grouse Core Area. Development in the Core Area would reduce the suitability of the developed area for greater sage-grouse because this species typically avoids areas with tall structures. Alternative A avoids or excludes wind-energy development on 280,697 acres, which would result in beneficial impacts to special status wildlife using these areas by keeping habitats intact.

ROWs and Corridors

Alternative A opens 2,188,294 acres (91 percent of the planning area) to ROWs, including roads, pipelines, transmission lines, and communications facilities. ROWs would result in habitat loss and fragmentation for special status wildlife and introduce hazards from electrocution, predation, and collision. Surface disturbance from ROW development would likely result in beneficial impacts to mountain plover and white-tailed prairie dog because they tend to move into recently disturbed sites. Open acres include 1,592,835 acres of the greater sage-grouse Core Area; greater sage-grouse likely would avoid ROWs that include aboveground structures, reducing the amount of usable habitat. Aboveground structures can have beneficial impacts to ferruginous hawks because most raptors utilize the structures for nesting platforms and as hunting perches. Alternative A manages 205,916 acres as ROW exclusion areas, of which 131,247 acres primarily along the NHTs are in the Core Area. ROW exclusion areas are closed to major ROW projects but are available for minor ROWs on a case-by-case basis. Large projects result in more surface disturbance; therefore, excluding major ROWs would reduce the amount of habitat such projects would adversely impact. Alternative A identifies 66,099 acres as ROW avoidance areas, which would offer less protection from habitat loss and fragmentation than exclusion areas; historically, large ROWs in avoidance areas have seldom been authorized. Alternative A does not designate utility corridors and co-locates major ROWs with existing utilities on a case-by-case basis to minimize surface disturbance. Co-locating utility lines would result in long-term beneficial impacts to special status wildlife by eliminating or reducing surface disturbance in intact habitats.

Livestock Grazing Management

Alternative A authorizes livestock grazing on 2,324,934 acres (97 percent of the planning area) of public land suitable for grazing. Livestock grazing is not authorized on 69,276 (3 percent of the planning area), including allotments previously closed (which does not vary by alternative), and lands deemed unsuitable for grazing (e.g., rock outcrops and roads). Most of the closed lands are in the Dubois area and provide habitat for Canada lynx, grizzly bear, gray wolf, northern goshawk, bald eagle, and sagebrush neotropical migrants. Closed lands have beneficial impacts on these species by reducing conflicts between special status predators and livestock and eliminating competition for habitat resources. Lands open to grazing could reduce habitat quality for special status wildlife, depending on grazing management, the grazing season of use, plant utilization levels, and the kinds and amounts of infrastructure built to facilitate grazing.

Alternative A adjusts livestock grazing use dates on open allotments in the Dubois area to minimize conflicts with grizzly bears on a case-by-case basis. Livestock are most vulnerable to predation from grizzly bears as bears emerge from hibernation dens between March and May and need to replenish depleted energy reserves. Grizzly bears typically remain in the area until mid to late June, at which time they often move to higher-elevation forested habitats. Encounters with livestock can result in the death or relocation of offending grizzly bears; adjusting livestock grazing dates to later in the season would reduce the potential for such conflicts.

Alternative A establishes livestock forage utilization levels on a case-by-case basis; special status wildlife would benefit where utilization levels consider habitat needs. In areas where utilization levels are excessive, high plant utilization would adversely impact the success of ground-nesting special status birds by reducing plant density and the standing height needed to effectively conceal nests from predators. Alternative A prohibits salt or mineral supplements within ¼ mile of riparian-wetland habitats to prevent livestock congregation and plant over-utilization, beneficially impacting special status wildlife species that depend on riparian-wetland areas for water, forage, and hiding cover.

Alternative A allows range improvements in special status wildlife habitats on a case-by-case basis. It is expected that actions under Alternative A would disturb approximately 43 acres during the construction and/or development of approximately two reservoirs, three wells, two spring developments, and 15 miles of fence each year during the planning period. Concentrated livestock use at water developments typically removes vegetation that can facilitate INNS establishment and degrade the overall quality of habitat. New water developments constructed in greater sage-grouse nesting habitat would likely reduce hiding cover by facilitating increased harvest of standing grasses that shield nesting greater sage-grouse and young chicks, and reduce nesting cover needed for the following spring nesting period. New fences would add to the 2,285 miles of existing fence on public lands in the planning area, increasing the overall fragmentation of habitats and increasing the potential for collisions by special status birds. Alternative A modifies or removes existing fences on a case-by-case basis to facilitate wildlife movement or reduce hazards. Modifying or removing fences would beneficially impact special status birds and large mammals.

Recreation and Travel Management

Adverse impacts to special status wildlife can occur from concentrated recreation along NHTs and the CDNST and in areas surrounding developed recreation sites and campgrounds in the South Pass and Green Mountain areas. Special status wildlife tend to avoid areas with people, pets, and noise, and recreation activities during breeding, nesting, and birthing periods can cause animals to abandon their nests and/or young. Alternative A withdraws lands around developed recreation sites and campgrounds (724 acres) from locatable mineral exploration and development. This action would provide long-term habitat protection of these acres, but would not result in substantial beneficial impacts to special status wildlife because these species do not extensively use these areas. Alternative A does not include special management prescriptions for intensive recreation areas (Johnny Behind the Rocks, The Bus @ Baldwin Creek Area, the Sinks Canyon climbing area, the Dubois Mill Site area, the Sweetwater River WSA, Sweetwater Rocks, and the Coal Mine Draw area), but manages them as a planning area-wide ERMA. Management is directed at protecting resources, which would provide some beneficial impact to special status wildlife habitat by addressing adverse impacts to habitat from mechanized or motorized vehicle use, camping, rock climbing, and hiking.

Alternative A limits motorized travel to existing roads and trails on 2,226,504 acres (93 percent of the planning area). The alternative allows OHV use off existing roads and trails to perform necessary tasks such as retrieving big game kills, repairing range improvements, and performing mineral activities where surface disturbance would total less than 5 acres. Adverse impacts to special status wildlife habitats can occur from vehicles driving off existing roads, killing vegetation and increasing animal displacement and stress. Off-road (i.e., cross-country) use would increase habitat fragmentation and road proliferation because other OHV users tend to follow the same tracks. Alternative A limits motorized travel on approximately 163,075 acres (7 percent of the planning area) to designated roads and trails, primarily in the Whiskey Mountain, Lander Slope, Red Canyon, and Green Mountain ACECs. Designating roads and trails would keep vehicle travel out of sensitive areas, reduce road densities, and limit habitat loss for Canada lynx, grizzly bear, gray wolf, greater sage-grouse, and neotropical migrants. Alternative A closes 5,923 acres (0.2 percent of the planning area) to motorized travel, which would beneficially impact special status wildlife habitats by preventing loss and fragmentation and eliminating vehicle-caused stress to wildlife. A total of 111,002 acres, predominantly on Green Mountain and in the Lander Slope, Red Canyon, and Whiskey Mountain ACECs, are subject to seasonal travel closures during winter and early spring. In addition, Alternative A closes 14,729 acres in the Red Canyon area to over-snow travel, including motorized and nonmotorized use. Seasonal closures would protect special status wildlife from disturbance and the unnecessary expenditure of energy reserves during sensitive winter, breeding, and birthing/nesting periods.

4.4.9.3.2.4. Special Designations

The *Special Designations* section of this chapter describes Alternative A management actions and resulting impacts for ACECs, Congressionally Designated Trails, and WSAs. Alternative A designates nine ACECs totaling 119,622 acres (5 percent of the planning area), which would protect special status wildlife and their associated habitat from many surface-disturbing activities and related disruptive activities. ACEC management includes (1) closing lands or applying NSO stipulations for mineral leasing, (2) requiring a Plan of Operations for locatable mineral development and maintaining locatable mineral withdrawals in the Whiskey Mountain and East Fork ACECs, (3) prohibiting or limiting motorized vehicle use, and (4) avoiding major ROWs.

Lands in the Whiskey Mountain, East Fork, and Dubois Badlands ACECs provide habitat for Canada lynx, grizzly bear, gray wolf, bald eagle, northern goshawk, burrowing owl, dwarf shrew, spotted bat, neotropical migrants, and amphibians. Greater sage-grouse have been observed in the East Fork ACEC; however, there are no known leks in the ACEC and the area is not in the greater sage-grouse Core Area. The Lander Slope, Red Canyon, Beaver Rim, Green Mountain, South Pass Historic Mining Area, and NHTs ACECs provide habitat for most special status wildlife species except trumpeter swan and grizzly bear, although there have been unofficial reports of grizzly bears on the Lander Slope.

The NHTs have no direct beneficial impact on special status wildlife, however to the extent that management of surface-disturbing and development activities are restricted within approximately ¼ mile on each side of the trails (the ACEC area), special status wildlife habitat is also protected. The ¼-mile buffer will protect approximately 36,386 acres of habitat from surface disturbance. Alternative A does not specifically manage lands adjacent to the CDNST; therefore, there is no direct beneficial impact to special status wildlife.

Alternative A does not specifically manage NWSRS-eligible waterway segments along Baldwin Creek and the Sweetwater River with WSR prescriptions, but manages them in accordance with Lander Slope ACEC and Sweetwater Canyon WSA prescriptions, respectively. ACEC and WSA management that protects the overall stream values and maintains habitat in its present condition would result in beneficial impacts to special status wildlife using habitats adjacent to these waterways.

4.4.9.3.3. Alternative B

4.4.9.3.3.1. Program Management

Alternative B requires surveys to determine the presence or absence of BLM sensitive species in a project area prior to authorizing surface-disturbing and disruptive activities. Alternative B requires surveys and subsequent necessary mitigation for all sensitive species, not just the species routinely surveyed (greater sage-grouse, raptors, and mountain plover). This would reduce or eliminate adverse impacts to special status species and their habitats. Alternative B would result in greater beneficial impacts to BLM sensitive species than Alternative A.

Alternative B establishes limits on the amount of cumulative habitat loss from modification, fragmentation, and loss of function for each special status wildlife species. Limits are identified to ensure that adequate habitat is available for each special status wildlife species to prevent population declines that could contribute to the need for the USFWS to list the species under the ESA. This management action would result in greater beneficial impacts to special status wildlife than Alternative A, which does not specifically establish habitat loss limits.

Alternative B extends the timing limitation buffer around active special status raptor nests to 1.5 miles from the nest site and adjusts dates to reflect the later nesting and fledging periods needed for northern goshawk and burrowing owl. Increasing the buffer size would have a beneficial impact on ferruginous hawks because they are more sensitive to disturbance than most other raptors, and the increased distance should prevent nesting birds from abandoning eggs or chicks. Alternative B applies timing limitations to surface-disturbing and disruptive activities from April 1 to August 15 to protect northern goshawks, and from April 1 to September 15 to protect burrowing owls. Extending the protection periods and increasing the buffer distance would result in greater beneficial impacts to special status raptors than Alternative A.

Alternative B closes greater sage-grouse habitat in the Core Area to oil and gas and geothermal leasing to provide long-term protection of habitat from development activities. Alternative B allows leasing outside the Core Area. Alternative B would result in much greater beneficial impacts than Alternative A because Alternative B protects greater sage-grouse habitat in approximately 70 percent of the planning area from adverse impacts associated with oil gas and geothermal development activities.

Alternative B prohibits surface-disturbing and disruptive activities within 0.6 mile of occupied or undetermined greater sage-grouse leks. Alternative B protects 93,410 acres of breeding habitat on public surface lands for the long term, which represents almost a 600 percent increase in habitat protected than under Alternative A. In addition, BLM-authorized human activity on this same area is prohibited between 1 hour before sunset to 1 hour after sunrise between March 1 and May 15, unless the activity is specific to inventorying, monitoring, or viewing greater sage-grouse. This action would prevent noise and disruptive activities in and around leks during the breeding season that could interfere with greater sage-grouse breeding and cause a localized population decline. Alternative B avoids surface-disturbing and disruptive activities from February 1 to July 31 within 3 miles of occupied leks, equating to approximately 1,339,609 acres of public surface lands, to protect nesting greater sage-grouse. Alternative B protects 69 percent more acres of nesting habitat in the short term than Alternative A (794,452 acres). Overall, Alternative B would result in greater beneficial impacts to greater sage-grouse breeding and nesting habitats than Alternative A.

Alternative B limits the density of disturbances in identified greater sage-grouse breeding, nesting, and brood-rearing habitat to one disturbance per 640 acres, and manages cumulative surface disturbance to be less than or equal to 2.5 percent of the sagebrush habitat in the same 640 acres. Reducing the number and size of disturbances would reduce habitat loss and fragmentation, maintain habitat connectivity, and ensure large patches of habitat are available for greater sage-grouse. Alternative B would result in greater beneficial impacts than Alternative A, which does not impose such limitations.

To prevent area avoidance by greater sage-grouse, Alternative B prohibits new permanent structures taller than 12 feet within 1 mile of occupied nesting habitat. Alternative B would result in greater long-term beneficial impacts to special status wildlife than Alternative A, which avoids these types of structures on a case-by-case basis.

Alternative B limits noise from facilities to 10 A-weighted decibels above natural ambient noise (approximately 39 A-weighted decibels) when measured at the perimeter of occupied greater sage-grouse leks. This level would likely reduce adverse impacts from noise that can drown out greater sage-grouse vocalizations during the breeding season; however, research is currently on going to identify whether 10 A-weighted decibels above ambient noise is the most appropriate noise level to protect breeding greater sage-grouse. Alternative B requires anti-perching devices on all new overhead powerlines in greater sage-grouse, white-tailed prairie dog, mountain plover, and pygmy rabbit habitats to reduce predation from raptors. In addition, the BLM will work with ROW holders to identify conflict areas and get anti-perching devices installed on existing overhead powerlines in these same habitats. White-tailed prairie dogs and pygmy rabbits are typically not as susceptible to predation from raptors using overhead powerlines as greater sage-grouse and mountain plover. Installing anti-perching devices would likely result in beneficial impacts to greater sage-grouse and mountain plover, whereas the action will likely result in a neutral impact to white-tailed prairie dogs and pygmy rabbits. Where feasible, Alternative B requires that new low-voltage and high-voltage utility lines be buried in greater sage-grouse, white-tailed prairie dog, mountain plover, and pygmy rabbit habitats. This action would result in beneficial and adverse impacts to these species and prevent raptor deaths due to collisions with wires and electrocution. Burying powerlines would reduce raptor predation opportunities on special status wildlife, but could also result in the loss of habitat from trenching activities to bury the lines. Alternative B would result in greater beneficial impacts to special status wildlife from these management actions than Alternative A, except that requiring anti-perching devices in white-tailed prairie dog colonies and pygmy rabbit habitats is the same under both alternatives.

Alternative B prohibits surface-disturbing activities in all white-tailed prairie dog colonies and within 100 meters (approximately 60 feet) of suitable pygmy rabbit habitat. Prohibiting surface distance in pygmy rabbit habitat would result in long-term beneficial impacts to the species due to their small home range and the limited amount of suitable habitat in the planning area. Like Alternative A, Alternative B surface disturbance in white-tailed prairie dog colonies could result in adverse and beneficial impacts to the species because activities can result in animal death or displacement, but also can create additional habitat. Alternative B protects white-tailed prairie dog colonies large enough to support black-footed ferret populations from disturbance, which would ensure that potential ferret reintroduction sites are not compromised. Alternative B prohibits surface-disturbing activities that would adversely impact special status bats and their habitat within ¼ mile of identified bat maternity roosts and hibernation areas. Alternative B management that protects pygmy rabbit and bat habitats would result in greater beneficial impacts than management under Alternative A; Alternative B management that protects white-tailed prairie dog colonies would likely result in beneficial impacts the same as Alternative A.

Alternative B identifies traditional migration and travel corridors for special status wildlife as they are identified. Management actions that keep movement corridors between seasonal habitats and foraging areas open and unfragmented, whether corridors are on or adjacent to lands in the planning area, would result in long-term beneficial impacts to special status wildlife.

To protect the large number of special status wildlife species and their habitats, Alternative B closes lands in the Dubois area not in an ACEC or WSA to mineral and realty actions. Alternative B would not result in additional habitat loss or fragmentation from surface disturbance related to mineral extraction or ROW actions, therefore would result in greater long-term beneficial impacts to special status wildlife than Alternative A.

4.4.9.3.3.2. Resources

Lands with Wilderness Characteristics

Alternative B manages approximately 5,490 acres of land with wilderness characteristics as non-WSA lands with wilderness characteristics, and manages them to protect wilderness characteristics. Through overlapping management of the Whiskey Mountain ACEC, most of the area is closed to mineral development, mining, livestock grazing, and excluded from ROW development. The prescriptions would directly conserve special status wildlife, including habitat for grizzly bear, gray wolf, loggerhead shrike, sage thrasher, sage sparrow, Brewer's sparrow, and dwarf shrew. Closing the lands outside of the ACEC to motorized and mechanized travel and managing them to protect wilderness characteristics would result in beneficial impacts to special status wildlife species in these areas. Habitats would not be fragmented by roads, resulting in long-term beneficial impacts to special status wildlife. Human activity would result in short-term displacement impacts, but it is expected that these lands would not receive high levels of human activity.

Fire and Fuels

Under Alternative B, approximately 1,000 acres of prescribed fire and 1,500 acres of mechanical treatment will be conducted each year to address rangeland fire and fuel concerns. Impacts would be the same as for Alternative A, but will occur on more acres. Alternative B increases the number of acres treated by prescribed fire, which could increase the risk of unanticipated adverse impacts (i.e., hotter fires and escaped fire) to species inhabiting forest/woodland and grassland/shrubland habitats. The beneficial impacts of prescribed fire to wildlife would be the same or greater than Alternative A as more acres would be treated each year. Fire and fuels management will use full suppression to address wildland fire in areas of WUI, with developed recreation sites, with known cultural resources, and with aboveground utilities. Except for areas with known cultural sites that likely support wildlife habitat due to their protected status, full suppression areas have limited habitat value; therefore, impacts to special status wildlife, either adverse or beneficial, would be minor. Impacts from full fire suppression on known cultural sites would have a beneficial impact on special status wildlife, but the degree of benefit would depend on the size of the affected area. Full suppression will not be utilized across much of the planning area under Alternative B, which would increase the risks of landscape-level fires that could cause long-term habitat loss and displacement across large landscapes.

Vegetation

Alternative B manages forests and woodlands to benefit special status wildlife without using traditional silviculture practices, such as clear-cuts, except to address public safety concerns or in areas where forest health goals cannot be met without their use. Like general wildlife, special status wildlife typically avoid forest habitats in WUI areas and campgrounds due to the presence of humans, noise, and pets. Avoiding silviculture practices such a timber sales, selective cutting, and thinning would result in beneficial impacts to special status wildlife in the short term, because forest/woodland species are typically secretive and are easily disturbed by human activities. Not managing disease outbreaks in forest habitats would likely result in the loss of forest habitat, which would be a long-term adverse impact to timber-dependent special status wildlife. Alternative B does not allow forest product sales in the Lander Slope/Red Canyon and South Pass areas unless needed to address public safety or identified for wildlife habitat improvement. The elimination of noise and human presence related to tree or firewood cutting would have a beneficial impact on special status wildlife. Special status wildlife could be adversely impacted if timber gets too dense to allow sunlight to reach the forest floor and prevents the growth of understory plants.

Alternative B manages grasslands and shrublands for biological diversity and to benefit special status wildlife habitats. Many special status wildlife species live entirely within sagebrush-grass habitats, and management that maintains or enhances sagebrush habitats would result in long-term beneficial impacts to these species. Soil and vegetative treatments are used where needed to improve plant diversity, which would have beneficial impacts by creating a mix of grasses, forbs, and shrubs to meet special status species dietary and hiding-cover requirements. Beneficial impacts to wildlife would be slightly greater under Alternative B than under Alternative A, because Alternative B focuses on wildlife and special status species when managing grassland/shrubland habitats.

Alternative B prohibits surface-disturbing activities within ¼ mile of surface water, riparian-wetland areas, playas, and delineated 100-year floodplains, increasing protection on an additional 125,403 acres than Alternative A. Habitats remaining intact and unfragmented would result in direct beneficial impacts to special status wildlife, including amphibians, trumpeter swan, bald eagle, long-billed curlew, yellow-billed cuckoo, white-faced ibis, and greater sage-grouse. Alternative B closes and reclaims roads that degrade riparian-wetland conditions, would improve special status wildlife habitats. Alternative B focuses on changes in livestock grazing management (season of use, livestock numbers, and grazing rotation) rather than constructing range improvements to facilitate riparian-wetland improvement and move areas toward PFC. Having less infrastructure on the landscape that encourages increased livestock use or creates hazards or barriers to movement would result in long-term beneficial impacts.

Wild Horses

Alternative B removes and modifies fences to facilitate movement among wild horse herds, which would have a beneficial impact on special status wildlife movement and reduce the number of collision hazards, primarily for special status birds. Establishing viewing loops for wild horses could lead to increased vehicle traffic and short-term displacement of wildlife using areas adjacent to the roads. It is expected that viewing loops would utilize existing roads and trails and no additional surface disturbance, and subsequent special status wildlife habitat loss, would occur.

Cultural and Paleontological Resources

The area of protection surrounding cultural and paleontological resources increases under Alternative B, which would increase the amount of special status wildlife habitat protected near the sites. Locatable mineral withdrawals are pursued for the Warm Springs Canyon Flume and fossil areas in the Beaver Rim and Bison Basin proposed NNLs, and these areas will be subject to an NSO restriction for mineral leasing. These actions would conserve special status species habitat and result in greater beneficial impacts than Alternative A because more acres are protected from long-term habitat loss and fragmentation.

4.4.9.3.3.3. Resource Uses

Minerals

Alternative B allows locatable mineral entry on 954,776 acres (40 percent) of public surface and 1,167,862 acres (42 percent) of federal mineral estate; impacts from exploration and development activities would be the same as under Alternative A, but would occur on approximately 57 percent fewer acres of special status wildlife habitat. Alternative B pursues locatable mineral withdrawals on approximately 1,632,605 acres (68 percent) of the federal surface and mineral estate in the planning area. Lands with federal mineral estate pursued for withdrawal include 1,395,084 acres of mineral estate in the greater sage-grouse Core Area and 38,286 acres of mineral estate in LAUs. These acres equate to approximately 72 percent of the total federal mineral estate in the Core Area and 54 percent of the total federal mineral estate in LAUs. Management that pursues withdrawals would also have beneficial impacts on other special status wildlife species occupying the same habitats as greater sage-grouse and Canada lynx. Withdrawals would protect habitat from mineral exploration and development activities that result in habitat loss and wildlife displacement.

Alternative B opens a total of 816,619 acres (34 percent) of public surface to geothermal leasing and opens 529,576 acres (22 percent) of public surface to oil and gas leasing. Impacts to special status wildlife from exploration and development activities would be the same as under Alternative A, but would occur on approximately 60 percent fewer acres of habitat. Alternative B closes the greater sage-grouse Core Area to oil and gas and geothermal leasing, which would result in long-term beneficial impacts to greater sage-grouse in most of the planning area. Alternative closes approximately 31 percent of lands having high and moderate potential for oil and gas to leasing, which would reduce habitat loss, fragmentation, and connectivity impacts for greater sage-grouse and other special status wildlife caused by large-scale, intensive development activities. Alternative B closes most of the acres in LAUs to mineral leasing and opens only 7 acres; this would result in long-term beneficial impacts to species inhabiting the Dubois area.

Under Alternative B, it is anticipated that approximately 536 acres would be disturbed each year through oil and gas development activities, with 274 acres disturbed in the long term. Alternative B would disturb approximately 31 percent fewer acres than Alternative A, which would result in fewer adverse impacts to special status wildlife and their habitats. Alternative B opens the fewest acres to mineral leasing and potential future development, resulting in the least amount of habitat and habitat connectivity loss and fragmentation, and therefore greater beneficial impacts to special status wildlife.

Alternative B extends seasonal protections for greater sage-grouse, mountain plover, and raptor breeding and nesting sites to O&M of developed projects if the activity is determined to be detrimental to wildlife. Activities such as hydraulic fracturing (called fracking), powerline reconstruction, range improvements, and road maintenance are subject to timing limitations to protect wildlife. These types of activities can cause animal disturbance during the sensitive breeding and nesting period due to the length of time it takes to complete the work, the level of noise generated, and presence of people and equipment. It is expected that the O&M of projects would result in both short-term adverse impacts related to animal displacement and long-term adverse impacts if the level of activity results in area avoidance or loss of nests or young. Alternative B would result in greater short-term beneficial impacts to wildlife than Alternative

A, because Alternative B applies seasonal stipulations to disruptive activities associated with O&M of existing projects.

Areas closed to leasing or subject to major constraints are closed to geophysical activities and areas open are subject to the stipulations for surface-disturbing, disruptive activities, and vehicle travel identified for the area. Closing areas will provide long-term protection from adverse impacts caused by cross-country motorized travel, vegetation crushing and possible loss, and wildlife displacement. Restricting geophysical activities during sensitive times such as breeding, nesting, and winter periods will prevent abandonment or loss of nests or young, providing short-term beneficial impacts.

Alternative B opens a total of 464,859 acres (19 percent of the planning area) to phosphate leasing, of which 2,699 acres are in lands identified as having phosphate potential. Of the total acres open, 210,064 acres are in the greater sage-grouse Core Area, which equates to 12 percent of the Core Area in the planning area and approximately 13 percent of the acres open under Alternative A. Alternative B would result in greater beneficial impacts to sagebrush-obligate special status wildlife than Alternative A, because Alternative B closes more grassland/shrubland habitat to leasing, which would prevent permanent habitat loss and fragmentation from phosphate extraction where it occurs. Impacts to Canada lynx from phosphate leasing would be the same as under Alternative A because these habitats do not have potential for phosphate resources. Overall, Alternative B closes more acres of special status wildlife habitat to phosphate leasing and protects more acres in the long term from phosphate development activities; this would result in greater beneficial impacts to special status wildlife than Alternative A.

Alternative B opens approximately 185,266 surface acres (8 percent of the planning area) to mineral materials disposals, of which 85,611 acres overlap the greater sage-grouse Core Area. Alternative B closes 2,208,943 acres to mineral materials disposals, primarily in ACECs. Areas closed provide habitat for special status birds and mammals and closure would prevent habitat loss and fragmentation and result in long-term beneficial impacts. Alternative B would result in greater beneficial impacts to special status wildlife than Alternative A because Alternative B closes more acres to mineral materials disposals.

Lands

Alternative B makes available 5,436 acres for land tenure disposal by sale, exchange, or other methods, and an additional 1,435 acres with restrictions on how lands can be used. Alternative B reduces the amount of land available for land tenure adjustments by 38 percent over Alternative A and keeps more acres in public ownership, subject to management that considers special status wildlife values.

Renewable Energy

Alternative B wind energy management would result in greater beneficial impacts to special status wildlife than Alternative A because Alternative B opens just 41,372 acres (2 percent) of public surface lands in the planning area to development, which is 98 percent less acres than Alternative A. Alternative B would result in substantially less risk of adverse impacts to special status wildlife from loss and fragmentation of habitats and the construction of wind turbines, which can be hazards to birds and bats. Alternative B closes the greater sage-grouse Core Area to wind-energy development, which would beneficially impact the species in most of its range in the planning area.

ROWs and Corridors

Alternative B opens 475,181 acres (20 percent of the planning area) to ROWs, including 218,020 acres of the greater sage-grouse Core Area. Alternative B opens 86 percent fewer acres to ROWs in Core Area than Alternative A. Alternative B would provide long-term habitat protection from major ROWs for all special status wildlife using the excluded areas. Alternative B manages 315,962 acres as ROW avoidance areas, of which 138,616 acres are in the Core Area. It is expected that adverse impacts such as habitat loss and fragmentation and wildlife displacement from ROW projects in avoidance areas would be limited because projects would only be constructed if there is no other feasible site. Alternative B designates three utility corridors encompassing 15,364 acres in the planning area, with corridor widths ranging from 400 feet near NHTs to a minimum of 3,500 feet in the national energy corridor. Concentrating ROWs in corridors would result in beneficial impacts by reducing the amount of new surface disturbance in habitats and limiting the amount of new surface disturbance in previously undisturbed and unfragmented habitats. Alternative B would result in the fewest adverse impacts to special status wildlife compared to other alternatives because it excludes or avoid more acres for ROWs, thus providing long-term protection of habitat.

Livestock Grazing Management

Alternative B opens approximately 2,312,095 acres (97 percent of the planning area) for livestock grazing, 12,839 fewer acres than Alternative A. Alternative B closes more acres in LAUs, which would beneficially impact Canada lynx habitat and reduce livestock predation impacts from grizzly bear and gray wolf.

Closing Sweetwater Canyon to livestock grazing would beneficially impact special status amphibians and birds by eliminating livestock concentration in riparian-wetland habitat that could lead to a decline in habitat quality. Riparian-wetland habitat and adjacent shrubland habitat is used extensively for bird nesting and brood-rearing cover, and eliminating livestock grazing would reduce plant utilization (above big-game plant utilization) that could reduce nesting hiding cover. Closing additional lands in the Dubois area will benefit special status wildlife using those areas. To address potential predation concerns, Alternative B adjusts livestock grazing use dates on all allotments in the Dubois area that overlap times when grizzly bears emerge are likely be in the allotment. In most cases, Alternative B does not allow livestock grazing before June 15, therefore eliminating or reducing the potential for conflicts between grizzly bears and livestock that could result in accidental or illegal take of grizzly bears.

Under Alternative B, livestock grazing levels will not exceed light utilization in areas preferred by livestock, typically riparian-wetland areas, adjacent upland areas, and around salt and mineral supplements and water troughs and developments. Alternative B prohibits salt or mineral supplements within ½ mile of riparian-wetland habitats to prevent livestock congregation at water sources; this increases the protection under Alternative A by ¼ mile. This action would help reduce livestock impacts to riparian-wetland habitats essential for most species of special status wildlife. Alternative B also prohibits the placement of salt or mineral supplements within 0.6 mile of greater sage-grouse leks, which would protect the breeding area and adjacent nesting habitat from livestock trampling and the impacts of heavy plant utilization. Alternative B focuses on the use of livestock grazing management strategies that do not require the construction of additional water sources or fences to maintain, enhance, or achieve rangeland health. It is assumed that no new reservoirs, wells, spring developments, or fences would be constructed during the planning period. Not increasing the number of range improvements that could impede or pose a hazard to movement, increase plant utilization in localized areas, and/or result in habitat loss, fragmentation, and modification would result in beneficial impacts to special status wildlife. As opportunities arise, Alternative B removes or modifies fences built for livestock management to address adverse impacts to special status wildlife movement, which would result in long-term beneficial impacts.

Alternative B prohibits livestock water development projects in greater sage-grouse nesting areas to prevent heavy grazing utilization levels that could adversely impact the availability of adequate nesting cover. This action would provide long-term protection of nesting habitat. To reduce crossing or flight hazards and curtail additional habitat fragmentation, Alternative B does not allow new fences unless they would be necessary to address human or wildlife safety concerns, and removes existing fences where appropriate.

Overall, Alternative B grazing management would result in greater long-term beneficial impacts to special status wildlife than Alternative A.

Recreation and Travel Management

Compared to Alternative A, Alternative B withdraws 1,487 more acres around five interpretive sites from locatable mineral exploration and development. This management action would withdraw and protect the largest number of acres of special status wildlife habitat around recreation sites compared to the other alternatives; however, special status wildlife do not extensively use habitats at or adjacent to interpretative sites due to the increased level of human activity. Alternative B manages as SRMAs the ERMAs listed under Alternative A and excludes the areas from mineral leasing, locatable mineral exploration and development, wind-energy development, and ROWs. This action would result in greater beneficial impacts to special status wildlife habitat than Alternative A, but could cause wildlife displacement or area avoidance because of an increase in human presence in the SRMAs.

Alternative B limits motorized travel to existing roads and trails on 2,128,741 acres (89 percent of the planning area) and limits motorized travel to designated roads and trails on 193,704 acres (8 percent of the planning area). Alternative B limits motorized travel to designated roads and trails on 30,629 more acres than Alternative A, which would reduce the potential for habitat loss and fragmentation that can result from all the roads and trails being open to motorized vehicle travel. Increasing the number of acres on which motorized travel is limited to designated roads and trails would increase protections for special status wildlife by directing roads and travel away from sensitive habitats.

Alternative B increases the number of acres closed to motorized travel to 71,761 acres, or approximately 3 percent of the planning area. In addition to motorized travel, Alternative B closes those acres to mechanized travel. Closing more areas would result in long-term beneficial impacts to special status wildlife by eliminating habitat loss and fragmentation and wildlife displacement. Alternative B closes all roads and trails in WSAs to motorized and mechanized travel, which would increase the beneficial impact of these areas to special status wildlife. Roads and trails in closure areas would rehabilitate over time, returning the disturbed roads to usable habitat. Alternative B seasonally closes 116,805 acres of habitat, 5,803 more than Alternative A, therefore increasing the amount of area protected during sensitive winter, breeding, and birthing/nesting periods.

4.4.9.3.3.4. Special Designations

See the *Special Designations* section of this chapter for specific management actions regarding ACECs, Congressionally Designated Trails, and WSAs.

Alternative B designates 15 ACECs totaling 1,492,990 acres (62 percent of the planning area). Beneficial impacts to special status wildlife would be similar to impacts under Alternative A, but would occur on 1,373,368 more acres, approximately 12 times the number of acres designated under Alternative A. Alternative B manages ACECs with the most restrictive mineral and realty prescriptions, which would protect special status wildlife habitat in the long term from being lost or fragmented. This management would have direct beneficial impacts on special status wildlife and their associated habitat in the long term by (1) closing lands to mineral leasing, (2) pursuing locatable mineral entry withdrawals, (3) closing or limiting motorized vehicle use, (4) excluding major utility systems, ROWs, and wind-energy development, and (5) prohibiting other surface-disturbing activities not compatible with retaining or enhancing the areas' values. Alternative B designates the Government Draw/Upper Sweetwater Sage-Grouse ACEC (1,246,791 acres) specifically to provide long-term protection to greater sage-grouse and their seasonal habitats. This ACEC incorporates 72 percent of the greater sage-grouse Core Area on public lands in the planning area. Alternative B would result in greater beneficial impacts to all sagebrush-obligate special status wildlife and their habitats than Alternative A, because Alternative B designates more acres and increases the level of protection from surface-disturbing and disruptive activities.

Alternative B protects the area within 5 miles either side of NHTs and the CDNST (the designated ACEC) from surface disturbance and facilities, unless projects would not be visible from the trails; this an increase of 4.75 miles over Alternative A for NHTs and 5 miles for the CDNST. This management would result in direct beneficial impacts to sagebrush-obligate and riparian-wetland special status wildlife because approximately 468,183 (NHT) acres and 259,380 (CDNST) acres would be protected from activities that could result in the loss and fragmentation of habitats. Many of these acres overlap, so the total is less than the sum of the acres for each type of trail.

Alternative B recommends NWSRS-eligible waterway segments as suitable for inclusion in the NWSRS and closes lands within ¼ mile of these waterways to mineral and realty actions and recommends them for withdrawal from locatable mineral entry. Alternative B also closes areas to motorized and mechanized travel and activities that would change the character of the waterways and adjacent areas. Management that reduces or eliminates the potential for habitat loss and fragmentation would beneficially impact special status wildlife. Alternative B increases the level of protection from surface-disturbing activities, and therefore would result in greater beneficial impacts than Alternative A.

4.4.9.3.4. Alternative C

4.4.9.3.4.1. Program Management

Alternative C requires surveys for BLM sensitive species on a case-by-case basis before authorizing actions and requires protective actions when appropriate. This would result in impacts the same as Alternative A and fewer beneficial impacts than Alternative B, because authorized activities could adversely impact some species where information is lacking.

Alternative C addresses habitat loss for special status wildlife on a case-by-case basis and does not establish limits for habitat loss except as required to protect ESA-listed species. Habitat loss not restricted on a cumulative basis could cause population declines not only in localized areas, but also throughout the species range. Alternative C would result more adverse impacts to special status wildlife than alternatives A and B, and almost the same impacts to ESA-listed species as Alternative B.

Alternative C applies a TLS to prohibit surface-disturbing activities within ½ mile of active peregrine falcon, northern goshawk, burrowing owl, and ferruginous hawk nests from February 1 to July 31. This nesting buffer is ¼ mile less than the buffer under Alternative A and 1 mile less than the buffer under Alternative B. Like Alternative A, the date range would adequately protect nesting and fledging ferruginous hawks and peregrine falcons, but would not be long enough to cover nesting and fledging northern goshawks and burrowing owls, therefore Alternative C would result in the same long-term adverse impacts to northern goshawks and burrowing owls as Alternative A. A ½-mile seasonal buffer would not be large enough to protect nesting ferruginous hawks from disturbance activities and would increase the risk of nest or chick abandonment for nesting peregrine falcons, northern goshawks, and burrowing owls. Alternative C would provide less protection for nesting raptors than alternatives A and B and therefore fewer beneficial impacts.

Like Alternative A, Alternative C opens the greater sage-grouse Core Area to oil and gas and geothermal leasing. Alternative C would result in impacts the same as Alternative A and much more adverse impacts than Alternative B, which closes the Core Area to leasing and eliminating the potential for adverse impacts from new development activities. Alternative C prohibits surface-disturbing and disruptive activities in or within ¼ mile of occupied greater sage-grouse leks and avoids surface-disturbing and disruptive activities in nesting habitat within 2 miles of occupied leks from February 1 to July 31. Management and impacts under Alternative C would be the same as under Alternative A, because Alternative C management actions would provide long-term protection of 16,283 acres of lek habitat and short-term protection for 794,452 acres of greater sage-grouse nesting habitat. Alternatives A and C would protect substantially fewer acres of lek habitat and nesting habitat than Alternative B. Alternative C avoids BLM-authorized human activities within ¼ mile of the perimeter of occupied greater sage-grouse leks between 8 p.m. and 8 a.m. from March 1 to May 15 unless activity is specific to inventorying, monitoring, or viewing greater sage-grouse. Alternative C would result in the same beneficial impacts as Alternative A and fewer beneficial impacts than Alternative B.

Like Alternative A, Alternative C does not limit the density of disturbances or acres of surface disturbance in identified greater sage-grouse breeding, nesting, and brood-rearing habitat. Surface disturbances that are close together could adversely impact the availability and usability of habitats and could decrease localized greater sage-grouse populations. Alternative C would result in more adverse impacts than Alternative B, which establishes disturbance densities, and the same impacts as Alternative A.

Alternative C allows high-profile structures in greater sage-grouse nesting habitats. Increased predation on nesting greater sage-grouse would occur from raptors utilizing tall structures as hunting perches, which could lead to greater sage-grouse population declines in localized areas. Alternative C would result in more adverse impacts from this management action than Alternative A, which allows tall structures on a case-by-case basis, and Alternative B, which prohibits tall structures within 1 mile of occupied greater sage-grouse nesting habitat.

Alternative C limits facilities that generate noise 10 A-weighted decibels above natural ambient noise when measured at the perimeter of occupied greater sage-grouse leks during the period of March 1 to May 15. This management would reduce noise that can affect male greater sage-grouse vocalizations during breeding activities. Alternative C would result in fewer beneficial impacts than Alternative B because Alternative C protects greater sage-grouse from noise impacts only during the breeding season and not during the remainder of the year. Alternative C would result in greater beneficial impacts than Alternative A, which endeavors to reduce, but not specifically limit, facility noise around occupied leks.

Alternative C allows the construction of aboveground utility lines in greater sage-grouse, white-tailed prairie dog, mountain plover, and pygmy rabbit habitats and requires, on a case-by-case basis, that utility lines be buried. Alternative C would result in adverse and beneficial impacts the same as Alternative A and more adverse impacts than Alternative B, which requires that more utility lines be buried to prevent electrocution and eliminate or reduce opportunities for predation by raptors. Alternative C requires anti-perching devices on new overhead powerlines on a case-by-case basis, which would not alleviate predation concerns in areas where devices are not installed. Alternative C would result in impacts the same as Alternative A, and alternatives A and C would result in greater adverse and fewer beneficial impacts than Alternative B, which requires anti-perching devices on all new overhead powerlines and seeks opportunities to retrofit existing powerlines.

Surface-disturbing activities are avoided in white-tailed prairie dog complexes larger than 100 acres on a case-by-case basis. This management will protect larger white-tailed prairie dog colonies that are large enough to potentially support a black-footed ferret population, but will not protect smaller colonies from disturbance that can result in the loss of prairie dogs through mortality or colony abandonment. The majority of white-tailed dog colonies or complexes in the planning area are smaller than 100 acres in size; therefore, there would be adverse impacts to the majority of the colonies in the planning area under Alternative C.

Alternative C allows surface-disturbing activities in occupied pygmy rabbit habitats on a case-by-case basis. Activities that result in loss of habitat would ultimately result in a decline in overall population numbers. Alternative C would result in impacts the same as Alternative A, and alternatives A and C would result in more adverse impacts than Alternative B, which prohibits surface disturbance in occupied pygmy rabbit habitat.

Alternative C allows surface-disturbing and disruptive activities in or adjacent to bat maternity roosts and hibernation areas unless direct bat mortality would occur. Activities can impact insect foraging areas, which would adversely impact food sources needed for nursing special status bats; this could lead to loss of young. Alternative C would result in more adverse impacts to bats than Alternative B, which prohibits disturbance within ¼ mile of maternity roosts and hibernacula, and would result in almost the same impacts as Alternative A, which avoids disturbance on a case-by-case basis.

Alternative C preserves essential migration and travel corridors needed for ESA-protected species, and does not specifically manage corridors for BLM sensitive species. Alternative C would beneficially impact threatened and endangered species, however this management would adversely impact other special status wildlife that require traditional corridors to access seasonal or foraging habitats unless these corridors overlap the corridors for the threatened and endangered species. Alternative C would result in greater beneficial impacts to ESA-listed species than Alternative A and the same beneficial impacts as Alternative B; however, Alternative C would result in more adverse impacts to BLM sensitive species than alternatives A and B.

Alternative C applies standard stipulations to resource uses (i.e., seasonal raptor nesting protection and riparian-wetland avoidance) to protect special status wildlife in the Dubois area, except in the Whiskey Mountain and Dubois Badlands WSAs, which Alternative C manages under the IMP for Lands under Wilderness Review. The IMP offers additional protection to special status wildlife because it closes WSAs to most surface-disturbing activities. Lands in the Whiskey Mountain and East Fork ACECs designated under Alternative A would not receive the same protections under Alternative C; therefore, surface-disturbing and disruptive activities in this areas would adversely impact special status wildlife habitats. Standard stipulations would not prevent the loss or fragmentation of habitats for the concentration of special status species that inhabit the Dubois area. Alternative C would result in greater potential for adverse impacts to special status wildlife throughout the Dubois area than alternatives A and B.

4.4.9.3.4.2. Resources

Lands with Wilderness Characteristics

Alternative C does not specially manage lands with wilderness characteristics in the Little Red Creek Complex which would reduce the quality and quantity of special status wildlife habitat because the alternative opens the entire area to surface-disturbing and disruptive activities. Habitat loss, fragmentation, and avoidance due to development and OHV activities would result in long-term adverse impacts to special status wildlife using the area. Increased human presence related to project development, and O&M of projects would result in short-term displacement impacts, depending on the amount of surface disturbance and the timing of disturbance activities. Alternative C would result in more adverse impacts to special status wildlife than the other alternatives, because Alternative C does not provide the additional habitat protections of ACEC designation and manages all lands with standard timing limitations. Because Alternative B manages only 5,490 acres as non-WSA lands with wilderness characteristics to protect wilderness character, impacts under Alternative C are only locally important.

Fire and Fuels

Under Alternative C, approximately 300 acres will be treated each year by prescribed fire and 500 acres will be treated using mechanical methods, which is the same as Alternative A. Alternative C will treat less acres using prescribed fire than Alternative B, decreasing the risk of unanticipated adverse impacts to special status wildlife habitats and reducing the beneficial impacts. Alternative C fire and fuels management will use full suppression to address wildland fire across the planning area, including the use of heavy equipment. Impacts to special status wildlife would be the same as under Alternative A. Full suppression could adversely impact wildlife in grassland/shrubland ecosystems that benefit from periodic fire needed to rejuvenate sagebrush and promote plant diversity, but would beneficially impact special status wildlife by reducing the potential for landscape-level wildfires.

Vegetation

Impacts to wildlife from forest management actions under Alternative C would be similar to impacts under Alternative A. The full range of silviculture techniques is used to improve forest health, provide forest products, and address forest insect and disease outbreaks. Managing for forest health and limited forest product sales would beneficially impact special status wildlife in the long term by maintaining healthy and diverse timber stands. Timber sales and cutting practices would adversely impact special status wildlife in the short term by causing displacement due to noise, road travel, and human presence, and in the long term from habitat loss, fragmentation, or alteration.

Alternative C manages grasslands and shrublands to maximize forage production on the ecological site and uses vegetative treatments to change plant community composition so as to facilitate grazing management. In most areas, management would result in an increase in herbaceous vegetation in the plant community and a decrease in shrubs. Treatments focused on increasing grass plant production would beneficially impact special status wildlife that occupy primarily grassland habitats, such as swift fox, Baird's sparrow, and mountain plover. Beneficial impacts would also apply, though to a lesser degree, to burrowing owls, white-tailed prairie dogs, and black-footed ferrets because they are generally found in habitats with a balance of sagebrush and grasses in the plant community. Increasing herbaceous forage would provide additional security cover for nesting and birthing activities for special status birds and mammals. Sagebrush- and other shrub-obligate species, including greater sage-grouse, neotropical migrants, pygmy rabbits, dwarf shrew, swift fox, gray wolf, and ferruginous hawks, would likely experience adverse impacts if there is a substantial loss of shrubs in the plant community that reduces suitable habitat. Alternative C would likely adversely impact shrub-obligate special status wildlife more than alternatives A and B, and would result in beneficial impacts to grass obligate species. There are more sagebrush- or sagebrush-grass-obligate species in the planning area than grass-obligate species; therefore, Alternative C could adversely impact more special status wildlife species in the long term than it would beneficially impact.

Alternative C prohibits surface-disturbing activities within 500 feet of riparian-wetland areas, but allows a lesser distance if riparian-wetland areas would still be adequately protected. More acres would likely be disturbed in special status wildlife habitats adjacent to riparian-wetland areas under Alternative C than under alternatives A and B, which would result in a less beneficial impact. Management needed to improve riparian-wetland areas toward PFC will consist of using all techniques available, such as construction of range improvements, closing roads that impact the areas, and changing livestock grazing strategies. Like Alternative A, livestock control fences and water developments under Alternative C could result in adverse (e.g., movement barriers, collision/entanglement hazards, and increased plant utilization) and beneficial (e.g., preventing livestock concentration, and riparian-wetland improvements) impacts to special status wildlife. Alternative C has the highest potential to result in adverse impacts to special status wildlife that depend on riparian-wetland areas. Alternative B would result in the greatest beneficial impacts to special status wildlife of all alternatives by increasing the protection distance adjacent to riparian-wetland areas and reducing the number of fences and water developments that could adversely impact special status wildlife and their habitats.

Wild Horses

Alternative C considers impacts to wild horse movement from new fences in herd management areas, but does not specifically remove or modify existing fences to facilitate wild horse movement. Alternative C would result in impacts the same as Alternative A and would not provide the beneficial impacts to special status wildlife movement or the reduction in collision hazards from fence removal or modification that Alternative B provides. Like Alternative B, Alternative C establishes wild horse viewing loops and would have the same impacts as Alternative B.

Cultural and Paleontological Resources

Alternative C beneficial impacts to special status wildlife from cultural and paleontological resources protection would be the same as Alternative A and less than Alternative B. Alternative B protects the most acres and increases the level of protection for cultural and paleontological resources of all the alternatives.

4.4.9.3.4.3. Resource Uses

Minerals

Alternative C allows locatable mineral entry on 2,385,576 acres of public surface and 2,800,467 acres of federal mineral estate in the planning area (more than 99 percent); mining could occur on almost the same number of acres of special status wildlife habitat as under Alternative A and 60 percent more acres than under Alternative B. Of the lands recommended for withdrawal, 3,540 acres overlap the greater sage-grouse Core Area and 3,485 acres are in LAUs. The number of acres equates to less than 0.2 percent of Core Area and 13 percent of the total acres of LAUs in the planning area. Alternative C allows existing withdrawals to expire, which would open lands, primarily in the Dubois area, to mineral exploration and development that could result in special status wildlife habitat loss, fragmentation, or modification. Adverse impacts from locatable mineral exploration and development activities under Alternative C would be greater than under Alternative A in the Dubois area and slightly greater than Alternative A throughout the rest of the planning area. Alternative B would result in fewer adverse impacts to special status wildlife than alternatives A and C.

Impacts from geothermal and oil and gas leasing under Alternative B would be similar to impacts under Alternative A. Alternative C opens a total of 2,295,114 public surface acres (96 percent) to geothermal leasing and opens 2,394,132 surface acres (more than 99 percent) open to oil and gas leasing. Alternative C closes 99,096 acres to geothermal leasing and 78 acres to oil and gas leasing. Of the total acres open to mineral leasing, 1,724,004 acres are in the greater sage-grouse Core Area, which is 78 fewer acres than the total amount of Core Area in the planning area. Alternative C would result in a greater risk of adverse impacts to greater sage-grouse habitats and other sagebrush-obligate special status wildlife utilizing these same habitats if leasing leads to development activities. In LAUs, 27,022 acres are open and no acres are closed to mineral leasing. It is anticipated that approximately 774 acres would be disturbed each year under Alternative C through oil and gas development activities, with 402 acres being disturbed in the long term. Alternative C will would result in almost the same impact from acres of disturbance as Alternative A and approximately 31 percent more acres disturbed than Alternative B, which would result in more adverse impacts to special status wildlife and their habitats. Alternative B opens the fewest acres to mineral leasing and potential future development, which would result in the least amount of habitat and habitat connectivity loss and fragmentation, therefore greater beneficial impacts to special status wildlife. Overall, Alternative C would result in more adverse impacts to special status wildlife than Alternative B and the same impact as Alternative A.

Alternative C does not include seasonal protections for greater sage-grouse, mountain plover, and raptor nesting during O&M of developed projects. Activities that cause nesting greater sage-grouse and other special status birds to abandon their nests or chicks can adversely impact local populations. Alternative C would result in more adverse impacts than Alternative B, that applies seasonal protections during O&M activities, and the same impact as Alternative A in areas where seasonal protections are not specifically identified during project analysis.

Alternative C impacts from geophysical activities would be the same as impacts under Alternative A. Alternative C would result in more adverse impacts to special status wildlife than Alternative B, because Alternative C opens more acres to geophysical activities that could adversely impact habitats and result in nest abandonment or chick/young mortality.

Alternative C opens a total of 2,272,359 public surface acres (95 percent) to phosphate leasing. Of the total acres open, 1,633,304 acres are in the greater sage-grouse Core Area and 26,405 acres are in LAUs. Alternative C opens 96 percent of the acres with phosphate potential to leasing and development, which is 17 percent more than Alternative A and 13 times more than Alternative B. Alternative C could adversely impact more acres of special status wildlife habitat than alternatives A and B. Alternative C would result in the greatest potential for adverse impacts to special status wildlife and the greatest potential for permanent loss of habitat from mining.

Alternative C opens 2,252,801 acres to mineral materials disposals, of which 1,619,072 acres overlap the greater sage-grouse Core Area. Alternative C closes approximately 141,409 surface acres to mineral materials disposals, primarily in riparian-wetland areas, greater sage-grouse leks, and pre-FLPMA withdrawal areas. Alternative C allows surface disturbance on a more habitat acres than alternatives A and B; therefore, Alternative C would result in the greatest potential for long-term adverse impacts.

Lands

Alternative C makes available 5,436 acres for land tenure disposal by sale, exchange, or other methods, and makes available an additional 1,435 acres with restrictions on future uses. Impacts to special status wildlife from land tenure adjustments would be the same as under Alternative B and less than under Alternative A. Alternatives B and C retain most acres in public ownership and subject to management that considers special status wildlife values when making land use decisions.

Renewable Energy

Alternative C opens 2,284,235 acres (95 percent) of public surface lands in the planning area to wind-energy development. Adverse impacts to special status wildlife from habitat loss/fragmentation and wildlife displacement could occur on a much larger number of acres than under Alternative B and on approximately 8 percent more acres than under Alternative A. Of the acres open to wind-energy development, 1,645,339 acres overlap the greater sage-grouse Core Area, which is 95 percent of the Core Area in the planning area. Alternative C management is the same as Alternative A and would result in a greater risk of adverse impacts to special status wildlife than Alternative B, which closes the greater sage-grouse Core Area to wind-energy development.

ROWs and Corridors

Alternative C opens 2,247,157 acres (94 percent of the planning area) to ROWs, including 1,619,589 acres of the greater sage-grouse Core Area, which is more acres of special status wildlife habitat than under alternatives A and B. Alternative C designates 660,908 acres as ROW corridors located across the planning area except in the Dubois area and having widths up to 3 miles wide. Alternative C excludes ROWs on 147,053 acres, with most of the exclusion acres being primarily along NHTs and in the Sweetwater Rocks, and avoids ROWs on another 11,714 acres. Alternative C opens more acres to ROWs and corridors than the other alternatives and would result in the greatest adverse impacts to special status wildlife.

Livestock Grazing Management

Alternative C manages the same amount of land as open and closed to livestock grazing as Alternative A, and impacts would be the same as under Alternative A. Alternative C would result in fewer beneficial impacts than Alternative B, because Alternative C closes fewer acres to livestock than Alternative B. Alternative C adjusts, on a case-by-case basis, livestock grazing season-of-use dates that overlap the time of year when grizzly bears are likely to be in the area and conflicts could occur. Livestock management under Alternative C is the same as under Alternative A, but would result in fewer beneficial impacts than Alternative B because Alternative C would not always adjust grazing dates; this could allow conflicts between grizzly bears and livestock and result in the removal of offending bears.

Alternative C employs all livestock grazing management strategies, including the use of fences and water developments, to maintain, enhance, or achieve rangeland health. Livestock management actions would disturb approximately 100 acres each year during construction and/or development of range improvements, which would include approximately two reservoirs, six wells, four spring developments, and 49 miles of fence. Alternative C would result in more acres of disturbance and potential habitat loss from range improvements than the other alternatives. Alternative C would increase habitat fragmentation for special status wildlife by allowing 34 additional miles of fence per year than Alternative A and 49 more miles per year than Alternative B.

Under Alternative C, livestock grazing levels will not exceed moderate utilization in areas preferred by livestock. Moderate grazing would increase plant utilization and decrease the amount of forage and cover available for special status wildlife. Alternative C prohibits the placement of salt or mineral supplements within ¼ mile of riparian-wetland areas, but places supplements to maximize livestock utilization of the range. Increasing livestock grazing utilization in sensitive special status wildlife habitats would likely result in wildlife displacement, increased plant utilization, and loss of habitat around the supplement locations. Adverse impacts under Alternative C would be greater than under Alternative B and slightly greater than Alternative A. Alternative C removes or modifies fences to facilitate livestock movement and management, which would not likely beneficially impact special status wildlife movement or reduce collision hazards.

Like Alternative A, Alternative C allows water development projects and new fences in greater sage-grouse nesting habitats on a case-by-case basis. Where projects are constructed, there could be adverse impacts to special status wildlife from increased livestock utilization of herbaceous plants, increased habitat fragmentation, and the introduction of new fence hazards. Alternative C would result in the same adverse impacts as Alternative A and more adverse impacts than Alternative B.

Overall, livestock grazing under Alternative C would result in more adverse impacts to special status wildlife than alternatives A and B because Alternative C allows more range improvements and higher plant utilization levels.

Recreation and Travel Management

Alternative C does not withdraw lands around developed recreation sites, campgrounds, and interpretive sites, and opens lands to locatable mineral exploration and development. Habitat would be lost if mining operations occur in these areas. Alternative C would result in more adverse impacts to special status wildlife than alternatives A and B, although impacts would not be considered substantial due to the limited use of these areas by wildlife. Alternative C recreation management areas would be ERMAs and would not be afforded additional protections from disturbance impacts. Alternative C adverse impacts to special status wildlife would be the same as under Alternative A and greater than under Alternative B.

Alternative C limits motorized travel to existing roads and trails on 2,337,958 acres (98 percent of the planning area), an increase of 5 percent over Alternative A and an increase of 10 percent over Alternative B. Alternative C limits motorized travel to designated roads and trails on 50,776 acres (112,299 fewer acres than Alternative A and 142,928 fewer acres than Alternative B), which could reduce impacts to sensitive habitats for special status wildlife. Alternative C closes 5,472 acres (0.2 percent of the planning area) to motorized and mechanized travel and does not apply any seasonal closures. Alternative C would result in adverse impacts to sensitive habitats and during sensitive times of the year such as winter, breeding, and birthing/nesting periods.

Restrictions to motorized vehicle use decrease under Alternative C, and special status wildlife in a larger percentage of the planning area would experience more adverse impacts from habitat loss/fragmentation and animal disturbance/displacement than under alternatives A and B.

4.4.9.3.4.4. Special Designations

See the *Special Designations* section of this chapter for specific management actions regarding special designations under Alternative C.

Alternative C does not designate ACECs and manages lands using standard stipulations. Alternative C applies a TLS for surface-disturbing activities in greater sage-grouse and raptor nesting habitat, which would result in short-term beneficial impacts. Alternative A applies an NSO restriction for greater sage-grouse leks, which would result in long-term beneficial impacts, although the NSO protection buffer is smaller under Alternative C than under Alternative B. Alternative C does not require Plans of Operation for lands open for locatable mineral exploration, which would result in impacts from habitat loss and animal displacement because there would be little opportunity to mitigate adverse impacts. Alternative C would have the greatest potential to result in habitat loss and fragmentation and impair connectivity between seasonal habitats.

Alternative C recognizes lands within ¼ mile either side of NHTs and the CDNST as part of the NLCS landscape, and restricts development on the VRM Class I and Class II historic trail segments of the NHTs. Alternative C would result in fewer beneficial impacts to special status wildlife than alternatives A and B along the NHTs and almost the same beneficial impacts as Alternative A along the CDNST.

Alternative C does not recommend NWSRS-eligible waterway segment as suitable for inclusion in the NWSRS. Alternative C manages the Sweetwater River waterway and associated special status wildlife habitat under the WSA IMP, which is the same management as Alternative A and less protective than management under Alternative B. Alternative C manages the Baldwin Creek waterway using standard stipulations that are less protective than Alternative A or Alternative B, which would have ACEC prescriptions, and would result in the greatest potential for adverse impacts to special status wildlife. Overall, Alternative C prescribes the least amount of protection, therefore would result in the most adverse impacts to special status wildlife.

4.4.9.3.5. Alternative D

4.4.9.3.5.1. Program Management

Like alternatives A and C, Alternative D requires, on a case-by-case basis, surveys to determine the presence or absence of BLM sensitive species in suitable habitat prior to authorizing activities. When species are determined to be present, appropriate mitigation is required to protect the species and limit adverse impacts to their habitats. Like alternatives A and C, Alternative D would result in fewer beneficial impacts to special status species than Alternative B; Alternative B requires surveys in all cases and therefore would provide opportunities to mitigate impacts to BLM sensitive species for which there is no existing information.

Alternative D establishes DDAs in the Shoshoni-Lysite area, the Gas Hills, and in the Beaver Creek area to focus on energy development. Surface use and TLSs to protect wildlife and special status wildlife would be applied at the leasing stage but exceptions would be frequently authorized to exempt crucial winter range protection to facilitate development. Exceptions would not be routinely authorized for protections for special status species. Granting exceptions for big game crucial winter range would adversely impact special status wildlife that occupy the same area, such as migratory songbirds, that are not subject to specific timing or surface use stipulations.

Alternative D establishes acceptable limits for habitat loss, modification, fragmentation, and loss of function for priority special status wildlife species. This alternative would beneficially impact species identified as being at greater risk from habitat changes that can contribute to localized population declines. There could be uncontrolled habitat loss for species not on the priority list under Alternative D. Alternative D would result in greater beneficial impacts than alternatives A and C, which do not establish limits or apply limits only as required by the USFWS to protect threatened and endangered species. Alternative B establishes limits for all special status wildlife species and would result in greater beneficial impacts than Alternative D.

Alternative D applies a TLS to prohibit surface-disturbing activities within ¾ mile of active peregrine falcon, northern goshawk, and burrowing owl nests and within 1 mile of ferruginous hawk nests. The protection dates for peregrine falcon and ferruginous hawk are February 1 to July 31, which are the same dates for most raptor species (see the *Fish and Wildlife Resources – Wildlife* section for more information). The protection dates are April 1 to August 31 for northern goshawk and April 1 to September 15 for burrowing owl. Under all alternatives, bald eagle nests are protected from February 1 to August 15 within 1 mile of the nest. Increasing the protective buffer for ferruginous hawks over that in alternatives A and C would offer greater protection to active nests, because ferruginous hawks tend to be more sensitive to disturbance actions than most other raptor species. The Alternative D TLS dates for northern goshawk and burrowing owl are the same as under Alternative B; however, Alternative D would provide better protection than alternatives A and C because these raptor species typically initiate nests later in spring, thus chicks fledge later in the year.

Alternative D opens the greater sage-grouse Core Area to oil and gas and geothermal leasing. There would be a greater risk of habitat loss and fragmentation resulting from lease development activities under Alternative D than under Alternative B, and the same risk as under alternatives A and C. Alternative D limits disturbances in the Core Area to one energy production location and/or transmission structure per 640 acres and does not allow the cumulative value of existing disturbances to exceed 5 percent of the sagebrush habitat within those same 640 acres unless projects are co-located and a similar number of habitat acres are left undisturbed. Alternative D manages the Core Area in subunits to facilitate concentrating structures/projects that could exceed the density and cumulative disturbance thresholds and to leave large areas of greater sage-grouse habitat intact. In cases where thresholds would be exceeded, Alternative D manages a corresponding number of acres to remain undisturbed. Alternative D would result in greater beneficial impacts than alternatives A and C, which do not limit the density of disturbances or the cumulative acres of surface disturbance in greater sage-grouse habitat. However, Alternative D would result in more adverse impacts than Alternative B, which limits cumulative surface disturbance to 2.5 percent of the sagebrush habitat in the same 640 acres, half the limit than under Alternative D.

Alternative D prohibits surface-disturbing and disruptive activities on or within 0.6 mile of the perimeter of occupied or undetermined greater sage-grouse leks in the Core Area and on or within ¼ mile outside the Core Area. Alternative D protects 102,212 acres of breeding habitat on public surface lands for the long term, which represents a 3.6 percent increase in habitat protected for the long term over Alternative A, a 3.6 percent increase over Alternative C, and a 0.4 percent increase over Alternative B. The differences reflect that a ¼-mile buffer was used around a single point in alternatives A, B, and C whereas the buffer in Alternative D was calculated around the newly mapped perimeter of the lek. In suitable greater sage-grouse habitat in the Core Area, Alternative D prohibits surface-disturbing and disruptive activities between March 1 and July 15 to protect nesting activities. Outside the Core Area, Alternative D prohibits surface-disturbing and disruptive activities between March 1 and July 15 within 2 miles of the perimeter of occupied or undetermined greater sage-grouse leks. Alternative D shortens the nesting protection period by 4 weeks at the beginning of the period and by 2 weeks on the end of the period over the February 1 to July 31 dates under alternatives A, B, and C. Delaying the start of the nesting period protection would not likely be an adverse impact on greater sage-grouse because they typically do not initiate nests before mid-March. Cutting 2 weeks off the end of the nesting period could result in adverse impacts because nesting might not be completed before the end of June in higher elevation areas or for birds that re-nest when first-attempt eggs/chicks are lost.

Alternative D prohibits disruptive activities between 6 p.m. and 8 a.m. from March 1 to May 15 on or within an 0.6-mile radius of the perimeter of greater sage-grouse leks in the Core Area and ¼-mile radius outside of the Core Area to protect sage-grouse strutting on leks and to protect breeding activities. This management action is similar to the other alternatives (8 p.m. to 8 a.m. from March 1 to May 15), except that the affected time starts 2 hours earlier in the evening. Greater sage-grouse usually arrive at leks approximately 2 hours before sunrise, but when there is a fuller moon phase, they can arrive after sunset and be on the lek all night. Alternative D would beneficially impact greater sage-grouse during these times by prohibiting disruptive activities earlier in the evening.

Alternative D limits facilities noise to 10 A-weighted decibels above natural ambient noise (approximately 39 A-weighted decibels), or the level determined appropriate through scientific findings, when measured at the perimeter of occupied greater sage-grouse leks. This level would likely reduce adverse impacts caused by noise that drowns out greater sage-grouse vocalizations during the breeding season. Alternative D management is similar to Alternative B, but less restrictive than alternatives A and C.

Alternative D allows new permanent structures taller than 12 feet in greater sage-grouse nesting habitat on a case-by-case basis. Raptors use high-profile structures as hunting perches, and cause greater sage-grouse to avoid areas of suitable habitat, resulting in a reduction of usable habitat. In addition to greater sage-grouse, overhead structures can increase raptor predation on white-tailed prairie dogs, mountain plovers, and pygmy rabbits. On a case-by-case basis, Alternative D allows the construction of overhead powerlines in greater sage-grouse, white-tailed prairie dog, mountain plover, and pygmy rabbit habitats and requires the installation of anti-perching devices. Low-voltage powerlines could be required to be buried to reduce predation opportunities. These management actions under Alternative D would result in the same or fewer adverse impacts as Alternative A and the same or more adverse impacts than Alternative B, which prohibits new high-profile structures within 1 mile of greater sage-grouse nesting habitat. Alternative C does not restrict tall structures, and therefore would result in the greatest risk for adverse impacts.

Alternative D prohibits surface-disturbing activities within 200 feet of occupied pygmy rabbit habitats and avoids these same activities in white-tailed prairie dog colonies, where possible. Due to the pygmy rabbit's small home range, this management action would provide long-term protection of their habitat. This distance is not as great as under Alternative B, but would result in more beneficial impacts than alternatives A and C, which do not specifically prohibit activities that can cause habitat loss and animal displacement. Avoiding surface-disturbing activities in white-tailed prairie dog colonies could protect the loss of burrow habitat and the displacement of animals, but surface-disturbing activities could also beneficially impact the species because prairies dogs will utilize disturbed ground to expand their colonies. It is expected that Alternative D would result in almost the same impacts as alternatives A and C, and slightly fewer beneficial impacts than Alternative B.

Alternative D prohibits surface-disturbing and disruptive activities within ¼ mile of known bat maternity roosts and hibernation areas unless it is determined that the action would not adversely impact either the bats or their habitat. Alternative D would result in the same beneficial impacts as Alternative B. Compared to alternatives A and C, alternatives B and D would better protect these sensitive habitats from BLM-authorized activities that could make the habitat unusable or result in localized population declines.

Alternative D could result in the loss of movement corridors special status wildlife need to access seasonal habitats or maintain genetic diversity, because Alternative D protects movement corridors only on a case-by-case basis. Management under Alternative D is the same as management under Alternative A. Both these alternatives would result in a greater risk of adverse impacts than Alternative B, which preserves special status wildlife travel corridors in all cases, but greater beneficial impacts than Alternative C, which preserves corridors only for threatened and endangered species.

To protect habitats for the large number of special status wildlife species that occupy lands in the Dubois area, Alternative D closes lands outside the Whiskey Mountain and East Fork ACECs and the Whiskey Mountain and Dubois Badlands WSAs to most surface-disturbing activities related to mineral and realty actions. Special status wildlife habitats in ACECs and WSAs are managed according to the prescriptions for the respective areas. Alternative D closes the rest of the Dubois area lands to mineral leasing and mineral materials disposals and excludes these lands to major ROWs; however, lands will remain open to locatable mineral development. Exploration and development activities associated with locatable minerals would likely result in adverse impacts to special status wildlife that use affected areas and adjacent lands. Alternative D would result in the same beneficial impact of closing special status wildlife habitat in the Dubois area to most activities that can result in habitat loss and fragmentation as Alternative B, and much greater beneficial impacts than alternatives A and C.

4.4.9.3.5.2. Resources

Lands with Wilderness Characteristics

Alternative D manages 4,954 acres of lands with wilderness characteristics as non-WSA lands with wilderness characteristics, slightly less acreage than is managed under Alternative B. Due to resource protections associated with non-WSA lands with wilderness characteristics management, including closing the area to motorized travel and limiting mechanized travel to designated routes, this management would benefit special status wildlife species in the area. Alternative D would result in greater beneficial impacts than alternatives A and C, which allow motorized travel on all existing roads and trails, but fewer beneficial impacts than Alternative B, which prohibits both motorized and mechanized travel. Under Alternative D, lands in the Whiskey Mountain ACEC are subject to the ACEC prescriptions, which would beneficially impact special status wildlife species occupying the area.

Fire and Fuels

Under Alternative D, approximately 500 acres of prescribed fire and 500 acres of mechanical treatment will be performed each year to address rangeland fire and fuel concerns. Alternative D increases the use of prescribed fire by 200 acres and therefore increases the risks of unintended consequences over alternatives A and C; Alternative D decreases prescribed fire by 500 acres compared Alternative B. Management uses a full range of suppression tactics based on the resources at risk to address wildland fire, including the use of heavy equipment. This could beneficially impact special status wildlife because selection of the appropriate suppression tactic could prevent long-term adverse impacts to sensitive habitats. Alternative D could increase the risk of adverse impacts to special status wildlife habitat from the use of heavy equipment during suppression efforts.

Vegetation

Alternative D manages forests and woodlands to address forest and woodland health conditions, wildlife habitat needs, and the demand for forest products using a full range of silviculture practices. Alternative D manages treatment of forest insect and disease outbreaks and the implementation of forest replanting on a case-by-case basis. Where there are treatments, they would protect the greater forested landscape from catastrophic losses and therefore beneficially impact timber-dependent special status wildlife. Alternative D allows clear-cuts with other resource values and silviculture objectives determining the sizes and locations of the cuts. These actions are almost the same as management actions under Alternative A, and the actions would result in short-term adverse and long-term beneficial impacts to special status wildlife.

Approximately 600 acres of short-term disturbance are anticipated from forest and woodland management (areas of mechanical treatments and forest product sales) over the planning period under Alternative D. Treatments would result in beneficial and adverse impacts to special status wildlife, depending on the species and the sizes of treatment patches.

Forest management plans will be developed for the Green Mountain, South Pass, and Dubois areas to address the sale of commercial and over-the-counter forest products, enhancement of forest health conditions, and the management of pine beetle infestations. Alternative D prohibits commercial forest product sales that could adversely impact the availability of special status wildlife habitat and increase noise and human presence stressors on wildlife species in the Lander Slope and Red Canyon areas unless those actions are necessary to address human health and safety issues or improve forest health. Alternative D would result in fewer adverse impacts to wildlife habitat than alternatives A and C and slightly fewer beneficial impacts than Alternative B.

Like Alternative A, Alternative D manages grasslands and shrublands to achieve the vegetation attributes described in the NRCS Ecological Site Descriptions. Most special status wildlife depend on both shrubs and herbaceous plants to meet their forage and cover needs. Alternative D would result in greater beneficial impacts from managing for a balance of herbaceous and woody vegetation than Alternative C, but not as much as under Alternative B, which focuses on managing plant communities specifically for wildlife. Vegetation treatments will be utilized to alter plant community composition to achieve rangeland health objectives and to meet resource objectives such as maintaining or enhancing greater sage-grouse habitat. Alternative D would result in fewer adverse impacts to special status wildlife than Alternative C, because Alternative C uses treatments to facilitate livestock grazing management that could conflict with wildlife habitat objectives. Overall, Alternative D would result in slightly fewer beneficial impacts from grassland/shrubland management actions than Alternative B, almost the same beneficial impacts as Alternative A, and more adverse impacts than Alternative C.

Alternative D prohibits surface-disturbing activities within 500 feet of water and riparian-wetland areas outside DDAs and closer than 500 feet inside DDAs providing adequate riparian-wetland protection can be achieved with a lesser distance. Protecting riparian-wetland habitats from loss, degradation, or fragmentation would beneficially impact special status wildlife because almost all species depend on these areas to meet their forage and cover requirements. Alternative D would result in fewer beneficial impacts than Alternative B, which prohibits surface disturbance within a greater distance from all riparian-wetland areas. Alternative D utilizes all tools, including range improvement projects, travel management strategies, and lease stipulations, to improve riparian-wetland areas and move them toward PFC. Healthy and diverse riparian-wetland habitats would beneficially impact special status wildlife; however, an increase in fencing and livestock grazing levels around water developments would adversely impact special status wildlife. Alternative D would result in slightly more adverse impacts than Alternative A, much more adverse impacts than Alternative B, and greater beneficial impacts than Alternative C.

Wild Horses

Like alternatives B and C, Alternative D establishes scenic loops for viewing wild horses in the planning area. Alternative D would result in a slightly greater risk of adverse impacts to special status wildlife from increased vehicle use and human presence related to viewing activities than Alternative A. Alternative D considers impacts to wild horses when authorizing new fencing projects and removes or modifies fences as opportunities arise to facilitate movement between wild horse herds. In areas where new fencing is not allowed or where existing fences are removed or modified, special status wildlife would benefit from the reduction in the number of movement hazards. Alternative D would result in greater beneficial impacts than alternatives A and C and fewer beneficial impacts than Alternative B.

Cultural and Paleontological Resources

The area of protection surrounding cultural and paleontological resources under Alternative D is much the same as under Alternative A and less than Alternative C. Alternative D protects fewer acres of special status wildlife habitat associated with cultural and paleontological sites than Alternative B, particularly related to mineral exploration and development, and would result in fewer beneficial impacts to special status wildlife than Alternative B.

4.4.9.3.5.3. Resource Uses

Minerals

Alternative D allows for locatable mineral entry on 2,757,625 acres (98 percent of the planning area). Adverse impacts to special status wildlife from habitat loss, modification, and/or fragmentation as a result of exploration and development activity would occur on 0.7 percent fewer acres than Alternative A, 1.5 percent fewer acres than Alternative C, and 57 percent more acres than Alternative B. Alternative D pursues continuation of the existing locatable mineral withdrawals in the Whiskey Mountain and East Fork ACECs, which would beneficially impact status wildlife using these habitats (bald eagle, northern goshawk, Canada lynx, grizzly bear, gray wolf, and neotropical migrants). Alternative D pursues a withdrawal for 3,897 acres in the Johnny Behind the Rocks RMZ that would prevent the loss of special status wildlife habitat and beneficially impact the species using the area. Of all the lands recommended for withdrawal, 4,739 acres overlap the greater sage-grouse Core Area and 18,321 acres are in LAUs. Alternative D would result in greater beneficial impacts to special status wildlife than alternatives A and C and more adverse impacts than Alternative B.

Alternative D opens a total of 2,254,741 acres to geothermal leasing with standard to major constraints and opens 2,351,440 acres to oil and gas leasing. This is 1.2 percent fewer acres than Alternative A and 1.8 percent fewer acres than Alternative C. Alternative D opens 77 percent more acres to leasing than Alternative B, which opens the fewest acres to mineral leasing and potential future development. As described for Alternative A, most development is expected to occur in areas with high and moderate potential for mineral resources that contain habitat for numerous special status wildlife species; mineral leasing would adversely impacted special status wildlife through habitat loss and fragmentation. New surface disturbance may result in beneficial impacts to white-tailed prairie dogs and mountain plover, so long as activities do not occur during the mountain plover breeding and nesting period. Under Alternative D, it is anticipated that approximately 724 acres would be disturbed each year through oil and gas development activities, and 375 of those acres would be disturbed in the long term. Alternative D makes available 1,724,082 acres of the greater sage-grouse Core Area to exploration and development, which is fewer acres than alternatives A and C but more acres than Alternative B. Alternative D applies disturbance thresholds to disturbance acres in the greater sage-grouse Core Area, as described above under *Program Management*. Alternative D would result in less habitat and habitat connectivity loss and fragmentation from lease development than alternatives A and C and more than Alternative B. Alternative D closes the entire Dubois area to oil and gas leasing and there would be no habitat loss and fragmentation from lease development activities; this action would beneficially impact the large number of special status wildlife in the area.

Alternative D extends seasonal protections for greater sage-grouse, mountain plover, and raptor nesting to activities deemed detrimental to special status wildlife that are connected with the O&M of developed projects on lands outside DDAs. Appendix I (p. 1435) lists activities subject to seasonal protections. Alternative D does not apply seasonal protections to these activities inside DDAs. Alternative D would result in greater beneficial impacts to special status wildlife during the sensitive breeding and nesting periods than alternatives A and C and fewer beneficial impacts than Alternative B, which applies seasonal protections to all lands.

Under Alternative D, lands closed to mineral leasing or subject to NSO are also closed to geophysical activities. Lands open to leasing are open to geophysical activities and subject to motorized travel limitations and restrictions on surface-disturbing and disruptive activities for the area. Closing habitats to geophysical activities would prevent adverse impacts from cross-country motorized travel and special status wildlife displacement. Restricting geophysical activities during sensitive times such as breeding, nesting, and winter periods would prevent abandonment or loss of nests or young, resulting in short-term beneficial impacts. Alternative D would have more beneficial impacts than alternatives A and C as it closes more acres of special status wildlife habitat to geophysical activities than alternatives A and C and fewer acres than Alternative B.

Alternative D opens 33 percent fewer acres to phosphate leasing than Alternative A, 38 percent fewer acres than Alternative C, and 48 percent more acres than Alternative B. Closing lands to phosphate leasing would beneficially impact special status wildlife by providing long-term protection of habitat. Alternative D closes 770,888 acres of the greater sage-grouse Core Area and 27,022 acres of LAUs to leasing, which is 88 percent more acres than Alternative A, 88 percent more acres than Alternative C, and 49 percent fewer acres than Alternative B. Alternative D would result in greater beneficial impacts than alternatives A and C because Alternative D closes more special status wildlife habitat to phosphate leasing, and more adverse impacts than Alternative B.

Alternative D opens 1,376,935 surface acres to mineral materials disposal, of which 838,857 acres overlap the greater sage-grouse Core Area. Alternative D opens 87 percent more acres than Alternative B, 36 percent fewer acres than Alternative A, and 39 percent fewer acres than Alternative C. Under Alternative D, less special status wildlife habitat, including sensitive or limited habitats, could be lost, modified, or fragmented from development activities. Alternative D would result in greater beneficial impacts than alternatives A and C and more adverse impacts than Alternative B.

Lands

Alternative D identifies 5,436 acres of lands available for disposal by sale, exchange, or other methods with, and makes an additional 1,435 acres available with restrictions for post-disposal use. Alternative D retains the same amount of acres in public ownership or with disposal restrictions as alternatives B and C and more acres than Alternative A. Alternatives B, C, and D would result in less risk of adverse impacts from the loss or alteration of special status wildlife habitat in than Alternative A, which makes more lands available for disposal.

Renewable Energy

Alternative D opens 459,720 acres (19 percent of the planning area) to wind-energy development, and avoids or excludes wind-energy development in the greater sage-grouse Core Area. Where wind energy is developed in the Core Area, facilities will need to meet the location density and cumulative disturbance thresholds described above under *Program Management*. Alternative D would result in a greater risk of adverse impacts to special status wildlife from habitat loss, fragmentation, and avoidance, particularly in sensitive or limited habitats, than Alternative B, which opens only 26 percent of the planning area to wind-energy development. However, Alternative D would result in fewer adverse impacts than alternatives A and C, which open 88 percent and 95 percent of the planning area, respectively.

ROWs and Corridors

Similar to the mineral and other realty management actions discussed above, Alternative D opens fewer acres to ROWs than alternatives A and C and more acres than Alternative B. Alternative D excludes 35 percent of the planning area for ROWs and designates 44 percent as ROW avoidance areas. ROW exclusion areas encompass 666,825 acres of the greater sage-grouse Core Area and 27,022 acres of LAUs. ROW avoidance areas encompass 976,329 acres of the greater sage-grouse Core Area in the planning area. Opening fewer acres to ROW development would reduce the risk of habitat loss and fragmentation for special status wildlife and the introduction of electrocution, predation, and collision hazards. As previously described, surface disturbance from ROW development would likely result in beneficial impacts to mountain plover and white-tailed prairie dog because they tend to move into recently disturbed sites. Alternative D would result in greater beneficial impacts to special status wildlife from excluding or avoiding more lands than alternatives A and C and more adverse impacts from excluding fewer lands than Alternative B.

Livestock Grazing Management

Alternative D opens approximately 97 percent of the planning area to grazing, which is almost the same as all the other alternatives. Alternative D closes 6,313 more acres to grazing than alternatives A and C and 6,526 fewer acres than Alternative B. Impacts would be almost the same as described for the other alternatives; however, Alternative D closes additional lands in the Dubois area, which would eliminate forage competition or reduce impacts to special status wildlife from livestock management activities. Like alternatives A and C, Alternative D adjusts livestock grazing use dates on a case-by-case basis on open allotments in the Dubois area to minimize conflicts with grizzly bears. Alternative D would result in a greater risk of grizzly bear removal by either relocation or death than Alternative B, which requires livestock grazing use dates be adjusted in all cases to minimize livestock-grizzly bear conflicts.

Alternative D livestock management actions would disturb approximately 42 acres each year during construction and/or development of range improvements. Alternative D allows more range improvement projects than Alternative B but fewer than alternatives A and C. Range improvement projects could beneficially and adversely impact special status wildlife by providing water in arid areas and changing where and how intensively habitats are grazed. Adverse impacts to special status wildlife from the construction of additional fences would be greater under Alternative D than alternatives A and B, which allow less fence construction, and less than under Alternative C, which allows more.

Alternative D allows livestock water development projects in greater sage-grouse nesting habitat if the project would improve nesting habitat and the development could be designed to be compatible with greater sage-grouse. Where constructed, water developments could adversely impact habitat near the developments through concentrated trampling and grazing use. However, water developments could beneficially impact special status wildlife through improved nesting cover in other parts of the grazing allotment. Alternative D allows new fences and removes existing fences on a case-by-case basis. Where new fences are constructed, there would be an increase in habitat fragmentation and the number of flight hazards across the landscape for all special status birds. Similar to the other alternatives, removing fences would beneficially impact special status wildlife. Alternative D would result in the same or greater beneficial impacts than alternatives A and C, which do not restrict livestock water development and fences in nesting habitat. Alternative D would result in more adverse impacts to greater sage-grouse nesting habitat than Alternative B, which prohibits water developments and new fences except to protect wildlife or to address human health and safety issues.

Alternative D allows a moderate level of plant utilization when a Comprehensive Grazing Strategy is in place. As described for Alternative C, greater plant utilization would increase the potential for decreased hiding cover for special status birds, particularly greater sage-grouse, which could facilitate nest failure or predation. Alternative B allows the lightest plant utilization levels and therefore would provide the most protection from adverse impacts related to overharvesting plants needed for special status wildlife cover or forage. Like Alternative B, Alternative D prohibits the placement of salt or mineral supplements within ½ mile of riparian-wetland areas and within 0.6 mile of greater sage-grouse leks. This action would prevent increased plant utilization and vegetation trampling in these key habitats, beneficially impacting special status wildlife.

Alternative D would result in greater beneficial impacts than alternatives A and C, which prohibit supplements only within ¼ mile of riparian-wetland areas.

Recreation and Travel Management

Alternative D impacts from recreation management actions would be the same as impacts under Alternative B, except that SRMAs and distinct ERMAs will constitute fewer acres under Alternative D. In most cases, management of SRMAs and distinct ERMAs would beneficially impact special status wildlife by protecting the areas from activities that could degrade habitat. Management prescriptions that reduce or eliminate surface-disturbing activities (i.e., NSO for mineral leasing and locatable mineral withdrawals) in the Johnny Behind the Rocks Area and the Dubois Mill Site would provide long-term protection of special status wildlife habitat. Several SRMAs are in the Lander Slope ACEC and will be managed according to ACEC prescriptions; this would also beneficially impact special status wildlife by limiting surface-disturbing activities. Alternative D would result in greater beneficial impacts than alternatives A and C and fewer beneficial impacts than Alternative B.

Alternative D limits more acres to motorized travel than alternatives A and C and fewer acres than Alternative B. Alternative D opens 92 percent of the planning area to motorized travel on existing roads and trails, opens 6 percent to designated roads and trails, and closes 1 percent to motorized and/or mechanized travel. Closing areas to motorized travel would result in the greatest beneficial impacts to special status wildlife by eliminating disturbance or displacement from vehicle use and providing long-term protection from habitat loss and fragmentation. Most of the areas closed to motorized travel are open to mechanized travel. Areas open to mechanized travel would result in slightly fewer beneficial impacts than areas closed to all travel. Compared to alternatives A and C, the number of acres subject to seasonal travel limitations increases under Alternative D. Seasonal travel limitations would protect special status wildlife during sensitive winter, breeding, and birthing/nesting times. Overall recreation and travel management actions under Alternative D would result in fewer adverse impacts to special status wildlife than alternatives A and C and fewer beneficial impacts than Alternative B.

4.4.9.3.5.4. Special Designations

Alternative D designates eight ACECs totaling 245,037 acres (10 percent of the planning area), which is 51 percent more acres than Alternative A, 100 percent more acres than Alternative C, and 84 percent fewer acres than Alternative B. ACEC management would result in direct beneficial impacts to special status wildlife in the long term because it would protect the areas from habitat loss or fragmentation by (1) closing lands to mineral leasing, (2) extending existing or pursuing new locatable mineral entry withdrawals, (3) closing or limiting motorized vehicle use, (4) excluding major utility systems, ROWs, and wind-energy development, and (5) prohibiting other surface-disturbing activities not compatible with retaining or enhancing the areas' values. Alternative D establishes the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area, a smaller portion of the area proposed for ACEC designation under Alternative B, which would be managed for long-term protection of greater sage-grouse habitat and the protection of habitat for other sagebrush-obligate special status wildlife. Alternative D designates the Twin Creek ACEC, which would be within the Greater Sage-Grouse Reference and Education Area, and closes the area to phosphate leasing and mineral materials disposals and excludes major ROWs outside the designated corridor. In addition, oil and gas leasing in the Twin Creek ACEC will be subject to an NSO stipulation. These management actions would protect habitat loss and the area's value as a reference area for greater sage-grouse and also benefit all other sagebrush-obligate special status wildlife species. Management prescriptions for the area would result in slightly fewer beneficial impacts than management under Alternative B and more beneficial impacts than alternatives A and C.

The East Fork and Green Mountain ACECs are larger under Alternative D than under Alternative A, increasing the amount of special status wildlife habitat covered by ACEC prescriptions. Alternative D does not designate the Dubois Badlands area as an ACEC and incorporates the 200 non-contiguous acres to the east of the badlands into the East Fork ACEC. This would not result in additional adverse impacts to special status wildlife because the IMP for the Dubois Badlands WSA would still protect their habitat. Alternative D management of mineral and realty actions in the Whiskey Mountain and East Fork ACECs is the same as management under alternatives A and B (the most restrictive possible) and would provide the greatest protection to special status wildlife habitat. Under Alternative D, the Beaver Rim, Lander Slope, and Red Canyon ACECs are the same sizes as under Alternative A, but Alternative D includes slightly more restrictive prescriptions regarding surfacing-disturbing activities, which would beneficially impact special status wildlife.

Alternative D increases protections along NHTs and the CDNST over Alternative A except for the part of the CDNST in the Crooks Gap area. Additional constraints for surface-disturbing activities to protect the integrity and setting of the trails would beneficially impact special status wildlife habitat. Alternative D would result in greater beneficial impacts to special status wildlife habitat from trail protection than alternatives A and C, and fewer beneficial impacts than Alternative B.

Alternative D recommends NWSRS-eligible segments on Baldwin Creek and Sweetwater River as suitable for inclusion in the NWSRS and manages those segments in accordance with the Lander Slope ACEC and Sweetwater Canyon WSA prescriptions respectively, which constrain mineral and realty developments. Alternative D increases the level of protection for surface-disturbing activities over Alternative A because Alternative D increases protections in the Lander Slope ACEC and Sweetwater Canyon WSA. Alternative D would result in greater beneficial impacts than Alternative C and more adverse impacts than Alternative B.

Overall, Alternative D management actions for special designation areas would result in more beneficial impacts to special status wildlife than alternatives A and C and fewer beneficial impacts than Alternative B.

4.4.10. Wild Horses

This section describes potential impacts to wild horses from management of other resources and resource uses. The BLM manages wild horses for self-sustaining populations of healthy, free-roaming animals in balance with other uses and the productive capacity of their habitat. Management of wild horses is performed consistent with the Wild Free Roaming Horses and Burros Act of 1971, multiple use objectives in the FLPMA, in conformance with the Wyoming Standards for Healthy Rangelands, and in compliance with relevant court orders and agreements, including the Consent Decree (August 2003). Adverse impacts to wild horses include management actions that impair the ability of native vegetation to produce forage, the availability of water, or other habitat components necessary to maintain the health of horses and the appropriate management levels in HMAs. Adverse impacts also result from management actions that impair wild horses' free-roaming behavior. Beneficial impacts to wild horses result from management that increases or improves vegetative health and amounts of forage and from management actions that support the long-term health, genetic viability, and free movement of wild horses in the HMAs.

4.4.10.1. Summary of Impacts

Primary adverse impacts to wild horses would result from management that reduces forage for and the health and free-roaming nature of wild horses. Alternative B would result in the greatest beneficial impact to wild horses due to its management emphasis on resource protection, which would increase forage and support the general free-roaming nature of wild horses. Alternatives A and C would result in similar types of impacts to wild horses, but Alternative C would result in more adverse impacts to wild horses than Alternative A, especially in the short term. Under all alternatives, wild-horse populations could be brought into balance with available habitat and resources needed to sustain genetically viable herds. Public encounters with wild horses would be the greatest under alternatives B and C because these alternatives increase opportunities for public viewing and opportunities for encounters associated with recreation.

4.4.10.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The number of wild horses will increase approximately 15 to 20 percent annually and herd numbers will be maintained by periodic removals. Natural reproduction and recruitment rates will continue to exceed natural mortality from predation, disease, and other factors. Wild horse numbers managed within the appropriate management level will not adversely will not adversely impact soil, water, or vegetation in a manner that would contribute to not meeting the Wyoming Standards for Healthy Rangelands.
- Wild-horse removals (gathers) will occur approximately every 3 to 5 years in each HMA.
- Maintenance of wild horse populations at appropriate management levels in existing HMAs will be accomplished through selective removal and application of other population control practices (i.e., fertility control).
- Wild-horse gathers will mostly use existing trap locations. Approximately 10 acres have been disturbed from the development of existing traps. It will be necessary to use new trap sites and disturb an additional 10 acres during the planning period.
- Public attitudes toward wild-horse protection and adoption will remain similar to attitudes over the past 10 to 20 years.
- Levels of wildlife will continue at the same rate as over the last 10 years.

4.4.10.3. Detailed Analysis of Alternatives

4.4.10.3.1. Impacts Common to All Alternatives

The types of impacts to wild horses under all alternatives would be similar; however, the extent and intensity of impacts would vary by alternative. Therefore, impacts to wild horses from soils and water management, surface-disturbing activities, minerals development, ROW development, motorized vehicle use, recreation, livestock grazing, special designations, fire and fuels management, wildlife use, and proactive management actions are described for individual alternatives.

Management in accordance with the Wyoming Standards for Healthy Rangelands would result in long-term beneficial impacts to wild horses. Conformance with the Standards for Healthy Rangelands (whether for soils, water, or vegetation) could result in short-term adverse impacts to wild horses if wild horses are determined to be a cause of not meeting the Standards for Healthy Rangelands.

Fencing to improve livestock grazing distribution and implement grazing systems would adversely impact the movement of wild horses and reduce their genetic viability and overall free-roaming nature. Water developments could improve the distribution of wild horses in each HMA, but also could draw wild horses into areas outside the current HMA boundaries. Conformance with the Wyoming Standards for Healthy Rangelands in upland areas would result in improved plant vigor, production, and diversity of species available as forage. This would provide consistent year-round forage and improve the year-round body condition of wild horses, which would have a beneficial impact on wild horses.

Management that decreases adverse impacts to water quality, watersheds, and soils, such as avoiding or prohibiting surface disturbance near water or on slopes, maintaining watershed improvement projects, and using BMPs to reduce runoff, soil erosion, and sediment yield to retain water on landscapes would result in long-term beneficial impacts to wild horses. Management of resources that enhance habitat and forage production contribute to habitat health and the overall health of horses.

All alternatives maintain herd numbers within the same range; therefore, herd numbers are not analyzed here. Maintaining the appropriate management levels of wild horses in the North Lander Complex of HMAs (Conant Creek, Muskrat Basin, Rock Creek Mountain, and Dishpan Butte) and the Lander Field Office portion of the Red Desert Complex (Green Mountain, Crooks Mountain, and Antelope Hills) would result in long-term beneficial impacts to wild horses. This provides for the maintenance of genetic viability of wild horses in the two complexes. Not restricting the movement of herds in the HMAs would further increase the genetic viability of wild-horse populations in HMAs. Employing selective removal criteria in accordance with current national policies during periodic gathers to increase desired genetic characteristics and avoid genetic depression would result in long-term beneficial impacts to wild horses by increasing long-term health and genetic viability.

HMAs are the same under all alternatives, therefore, this section does not address impacts to HMAs.

Considering the use of natural and artificial population control measures, as needed, to maintain the populations of wild horses within the established appropriate management levels would result in long-term beneficial impacts to wild horses by improving health of populations and facilitating effective strategies for the management of wild horses and their habitat.

Basing future adjustments in forage allocations in the HMAs on monitoring and multiple-use considerations through a revision of the HMA plan would result in long-term beneficial impacts to wild horses. The process involved in adjusting forage allocations through the revision of HMA plans would provide appropriate review of herd objectives and conditions before forage allocations are made.

The use of certified weed-free forage supplements would beneficially impact wild horses by decreasing the potential for INNS establishment and spread that would compete with native vegetation and lead to losses or changes in available forage. The use of forage supplements also would reduce competition between wild horses and other wildlife for food sources during droughts.

Management of special designations within HMAs could beneficially impact wild horses by limiting adverse impacts to resources (e.g., soil, water, and vegetation) that would impact wild horses. All alternatives manage wild horses in the North Lander Complex and Red Desert Complex of HMAs.

Management of WSAs would result in the same impacts to wild horses under all alternatives. There are 56 acres of the Sweetwater WSA in the Antelope Hills HMA. Generally, WSA management beneficially impacts wild horses. However, the acreage of protection for horses is negligible.

The Wild Horse and Burro Act of 1971 requires that protection of a natural ecological balance, including endangered and all other wildlife species, be a consideration when making wild-horse management decisions. Accordingly, management that makes the listing of any species under the ESA more likely would result in an adverse impact to wild horses because it may require a reduction in wild-horse numbers to limit their adverse impacts to the endangered species. Under all alternatives, HMAs include suitable habitat for greater sage-grouse.

4.4.10.3.2. Alternative A

4.4.10.3.2.1. Program Management

Providing opportunities for the public to view wild horses in the various HMAs could adversely and beneficially impact wild horses. Increased human presence could adversely impact wild horses by acclimating horses to human presence and reducing their wild, free-roaming nature. If human activity lasts long enough, wild horses might move outside the existing HMAs. Increased foal mortality due to foal abandonments and increased risk of injuries to humans could result as wild-horse and human interactions continue to increase. However, public awareness could increase adoptions and support for the wild-horse program. Increased fencing demands in the HMAs for livestock management and protection of riparian-wetland values would continue to threaten the wild and free-roaming character of wild horses. The BLM would evaluate all fences to determine impacts to wild horses in the HMAs.

4.4.10.3.2.2. Resources

Soil and Water

Soil and water management indirectly impacts wild horses because they are causal factors for vegetation health. As described in the *Soil* section of this chapter, soil is protected from erosion through slope and surface disturbance limitations. Alternative A closes 30,385 acres of HMAs to surface disturbance. Water quality and riparian-wetland health are protected by prohibiting surface disturbance on 21,262 acres of HMAs.

Forests, Forest Products, Fire and Fuels

Alternative A provides for the development of forest products in the Green Mountain area. If demand supported this use, it would result in a major beneficial impact to wild horses in the Green Mountain HMA by creating additional forage (once an over story of trees are removed, the site becomes dominated by various grass species until trees revegetate the site) over a period that would provide high-quality habitat for wild horses. This would result in short-term adverse impacts during logging or mechanical treatment operations because horses would be displaced. However, there is no anticipated demand for commercial timber; this would reduce the potential for beneficial impacts, which would not vary substantially among the alternatives.

Full suppression in fire and fuels management would both adversely and beneficially impact wild horses. Management that increases the occurrence and spread of wildland fires in the short term, such as reduced restrictions on fire suppression activities, would result in temporary displacement of wild horses and short-term reductions in available forage. However, fires of the appropriate intensity improve forage production in the long term and result in vegetative communities with increased diversity, cover, and age class. Recovery of burned areas could adversely impact wild horses. Burned areas might also require temporary fencing during stabilization and rehabilitation, which could temporarily inhibit the movement of wild horses. Because impacts from fences would be short-term, these impacts are not expected to affect the long-term genetic variability of wild horses.

Fire suppression activities, such as firebreaks and staging areas for suppression, also would result in short-term loss of forage. These impacts would be expected to be minor considering the amount of suppression activities and localized disturbance compared to the size of the planning area and HMAs. Any fire suppression activities in or near HMAs would increase adverse impacts to wild horses.

Mechanical fuels treatments, prescribed fire, and other fuels reduction activities would result in short- and long-term adverse impacts to wild horses. In the short term, fuels reduction could temporarily displace wild horses from localized areas. In the long term, fuels reduction activities that help return fire to its natural role in the ecosystem would result in improved forage production and vegetative diversity, which would beneficially impact wild horses. Under Alternative A, there would be long-term beneficial impacts from prescribed fire and mechanical fuels treatments. However, under Alternative A, the BLM would be more likely to construct range improvement projects and would only occasionally perform vegetative treatments; this would adversely impact wild horses, which benefit from vegetative treatments in the long term.

Aggressive initial attack and full suppression of all natural or human-caused wildfire would minimize short-term impacts to wild-horse habitat and forage. Although prescribed fire could impact habitat and forage availability over the short term, pending recovery of vegetation from the impacts of direct, over the long term, prescribed fire maintains vegetative productivity and diversity. This would retain the viability of wild-horse herds, where it does not conflict with livestock grazing, and continue the capability to meet established herd numbers.

Grasslands and Shrublands

Alternative A manages vegetation in accordance with the NRCS ecological site guides. Meeting identified vegetative goals could adversely impact wild horses if the desired plant community does not contain enough plant diversity or contains improper types of vegetation to support wild horses. Vegetative and fuels treatments to enhance forage production would result in short-term adverse impacts to wild horses because forage would not be available while the areas become established in HMAs. There would be long-term beneficial impacts to wild horses because more high-quality forage would be available in the HMAs. This would provide for better long-term health of the wild horses.

INNS establishment and spread left untreated outcompetes native vegetation and grasses and could reduce available forage for wild horses. This creates more competition between livestock and wildlife for available forage. INNS treatments and reductions could displace wild horses and reduce forage in the short term, but would result in long-term beneficial impacts because it would reduce INNS competition with native vegetation and increase available forage for wild horses.

Riparian-Wetlands

Riparian-wetlands management under Alternative A could adversely impact wild horses. If water is not available, wild horses could seek water outside HMAs, which would result in new horse populations outside the HMAs. Dropping water tables created by unsuitable riparian-wetlands and fencing to improve riparian-wetland systems can cause water to be unavailable.

Wildlife

Consideration of wildlife big game herd objectives in allocation of forage could be adverse to supporting wild horse numbers. This would be especially true where the big game population is over the objective. Management to improve wildlife habitat would result in overall beneficial impacts to wild horses by creating diverse, complex vegetative communities with improved forage in riparian-wetland, grass, and shrub communities. Alternative A allows fences on a case-by-case basis in big game migration corridors, which, when authorized, would be likely to result in adverse impacts to wild horses if the fences are installed within the boundaries of HMAs.

Special Status Species

Management of special status plant and animal species in HMAs could limit opportunities for enhancement of wild-horse populations. Some proposed actions for greater sage-grouse also would limit these opportunities. Establishment of forage utilization limits in greater sage-grouse nesting areas could require reductions in wild-horse numbers in HMAs. See the *Special Status Species* sections of this chapter for additional analysis. To protect special status plants, wild-horse gathering or exclusion could be required on a site-specific basis; however, this would not adversely impact the wild-horse program because other gather locations are available. Management of special status species that improves habitat and reduces fences would beneficially impact wild-horse habitat.

4.4.10.3.2.3. Resource Uses

Locatable Minerals

Locatable mineral activities under Alternative A would result in adverse impacts to wild horses by increasing surface disturbance and increasing human presence. Alternative A does not withdraw land in HMAs from locatable mineral activities. Approximately 35,765 acres of in HMAs have potential for bentonite or uranium, the most likely types of locatable minerals to be explored or developed. Bentonite and uranium mining activities would adversely impact wild horses through removal of vegetation until it can be reclaimed, through human presence, fragmentation of habitat, and the increased likelihood of fences that would adversely impact the wild and free-roaming character of the wild horses. Fences also could block migration routes to winter ranges, depending on fence locations. Forage reductions would adverse impact wild horses by increasing competition with livestock and other wildlife. Removing vegetation also would encourage INNS establishment and spread.

Other Minerals

Alternative A opens all of the planning area HMAs to fluid mineral leasing. Alternative A closes small areas of riparian-wetlands and NHTs to solid mineral leasing and mineral materials disposals. Adverse impacts to wild horses from leasable minerals would be the same as described for locatable minerals.

Renewable Energy

Wind-energy development under Alternative A would result in direct adverse impacts to wild horses. Alternative A opens most HMAs to wind-energy development and 125,098 acres in HMAs have high potential for wind energy. Removing vegetation would result in a direct loss of available forage and result in habitat fragmentation through the development of new roads and fences. New fencing would deteriorate the wild, free-roaming character of wild-horses by reducing the amount of area in which they move and could block migration routes to winter ranges, depending on the locations of new fences. Reductions in forage would adversely impact wild horses by increasing competition with livestock and other wildlife. Removing vegetation also would encourage INNS establishment and spread. Wild horses stay away from the activities and movements associated with wind turbines. Management in areas in HMAs where this activity is authorized would be sharply curtailed, with no ability to inventory or round up horses using rotary-type aircraft. On a long-term basis, it might not be possible to control herd numbers in areas where wind turbines are developed. The southern HMAs have high potential for wind-energy development, including some areas along Beaver Rim.

ROWs and Corridors

Surface disturbance results in the removal of vegetation, which directly reduces the available forage for wild horses and other grazing animals. Surface disturbance and clearing of vegetation without appropriate reclamation or rehabilitation can also lead to the establishment and spread of INNS, which also could reduce forage. Forage reductions adversely impact wild horses by increasing competition between livestock and other wildlife. Alternative A does not designate corridors and allows ROWs on a case-by-case basis. Alternative A does not avoid or exclude acres of HMAs to ROWs.

Trails and Travel Management

Management of trails and travel results in both short- and long-term adverse impacts to wild horses. Alternative A does not increase or decrease motorized travel in HMAs and does not reduce duplicative roads. Increased development of other resource uses would increase traffic on existing roads, but this would not be the result of travel management. Areas with seasonal travel limitations, such as in the Green Mountain area, reduce wild horse human interactions and would reduce adverse impacts to wild horses during winter when they are most vulnerable. Alternative A places seasonal travel limitations on 64 percent of the Green Mountain HMA.

Alternative A allows over-snow vehicles (snow machines) to run on existing roads and trails and cross-country in HMAs without any requirements for minimum snow depth. Motorized over-snow vehicles stress wild horses during winter and would increase the potential for wild-horse and human interactions, especially in areas near human population centers. This also would increase chances for wild horses to be harassed during critical winter months when they are already stressed by severe cold.

Livestock Grazing Management

Livestock grazing management under Alternative A would adversely and beneficially impact wild horses. Impacts to wild horses from livestock grazing depend on the location, timing, intensity, duration, and frequency of grazing. Livestock grazing management that results in the maintenance or improvement of range conditions as directed by the Wyoming Standards for Healthy Rangelands would beneficially impact wild horses, depending on how it is achieved. Range improvements associated with livestock grazing, such as springs, wells, and reservoirs, in HMAs would only result in theoretical beneficial impacts to wild horses because, although these range improvements would increase the availability of water, they would increase livestock use of upland vegetation. Increasing wild horse numbers show that wild horses currently have adequate water for their needs. Having more water developments but less forage would result in more of an adverse impact than a beneficial impact. Over the life of the plan, 416 acres would be disturbed from the development of spring, reservoir and well developments under Alternative A.

Alternative A would further adversely impact wild horses through the construction of fences for range improvements; fences would prevent herd movement and access to resources, and increase loss of vegetation along fence lines where livestock trail. Livestock grazing also would result in competition with wild horses for forage, water, and habitat; this would adversely impact wild horses, including where range improvement projects increase the use of upland vegetation in new areas. Alternative A manages all HMAs as open to livestock grazing. Drought conditions can exacerbate conflicts between wild-horse and livestock management related to water and forage availability on rangelands in HMAs. Under Alternative A, a total of 12,439 acres of surface disturbance is projected to take place over the planning period, including 355 miles of fences. It is not possible to determine how much of that activity would occur in HMAs; however, 41,333 acres in HMAs are not within 2 miles of a water development, which would make it likely that additional water developments and fences would be built in HMAs.

Alternative A authorizes fencing to promote healthy riparian-wetland areas. The use of permanent riparian-wetland fencing would result in short- and long-term adverse impact to wild horses by making the forage and water in the riparian-wetland unavailable. The use of temporary riparian-wetland fencing would result in a short-term adverse impacts to wild horses for the period the fence is in place. Fencing also could block migration corridors in the HMAs and prevent wild horses from moving freely to winter ranges. There would be long-term beneficial impacts to wild horses because improvements in riparian-wetland areas provide long-term, high-quality forage and water that would be available to wild horses. However, fencing of riparian-wetland systems could cause wild horses to seek water outside of HMAs, which would result in new horse populations outside HMAs.

Livestock grazing management under Alternative A could modify wild-horse distribution and their free-roaming nature, at least in the short term. As resource conditions improve, authorized active livestock grazing could increase without any adverse impact to wild-horse numbers. However, when grazing creates adverse impacts to resource values that cannot be rectified by changing livestock management, site-specific reductions in wild-horse numbers could occur. During drought conditions, the need to reduce grazing use (wild horse and livestock) could be compounded. Construction of additional fences would not beneficially impact wild horses, even though impacts would be minimized or mitigated through project layout and design. Fences could limit access to historic range and water, and restrict the free-roaming nature of wild horses.

Recreation

The Alternative A emphasis on increasing recreational uses, such as commercial opportunities and dispersed recreation, would adversely impact most HMAs. Recreation uses increase visitor numbers, motorized vehicles, and noise, thereby triggering an instinctive behavioral change in wild horses to avoid encounters with humans. Wild horses might slowly adapt to some of this increased use, but maximizing recreational use could create continued or prolonged disturbances. This would reduce or eliminate wild-horse use in a portion of an HMA, which would essentially decrease habitat acreage. Wild horses would concentrate in a smaller, more remote section of the HMA, increasing competition with wildlife and livestock for available forage and space, which could result in reductions in appropriate management levels. Additional recreation use also would increase the potential for displacement of wild horses to areas outside designated HMA boundaries, which would create the need for removal. Recreation management under Alternative A would result in localized short-term impacts to wild horses.

4.4.10.3.2.4. Special Designations

Under Alternative A, the Green Mountain ACEC is the only ACEC that overlaps an HMA. The only prescription for ACEC management is that mining and exploration activities of all sizes (not just those that would disturb more than 5 acres) require Plans of Operation. The BLM can use Plans of Operation as a tool to avoid undue or unnecessary degradation to the land, which would result in a minor beneficial impact to wild horses in the HMA.

4.4.10.3.3. Alternative B

4.4.10.3.3.1. Program Management

Alternative B wild horse management focuses on maintenance of healthy, viable herds and habitat and emphasizes conservation of physical, biological, heritage, and visual resources with constraints on resource uses. Alternative B establishes scenic loops in HMAs. Fencing and range improvements will be minimized under this alternative. Under this alternative, some water developments that could help wild-horse distribution in the HMAs and would not be constructed. Alternative B would result in long-term beneficial impacts to wild horses by increasing the availability of and ensuring the wild, free-roaming character of wild horses. This free movement also would improve the genetic viability of the wild horses and reduce the possibility of injuries and death associated with fencing. Providing opportunities for wild horse viewing in the HMAs would result in impacts the same as Alternative A.

Compared to other alternatives, management actions under Alternative B would result in the most direct and indirect beneficial impacts to wild horses and their habitat as those actions conserve the greatest land area for physical, biological, and heritage resources, and are the most restrictive to motorized vehicle use and mineral development.

4.4.10.3.3.2. Resources

Soil and Water

In general, management under Alternative B emphasizes the conservation and protection of soil and water and limits surface disturbance the most of any alternative, which would improve forage and the health of wild horses (see the *Soil*, *Water*, and *Vegetation – Grasslands and Shrubland Communities* sections of this chapter). Therefore, management of under Alternative B would result in the greatest beneficial impacts to wild horses compared to the other alternatives. However, Alternative B would result in adverse impacts to wild horses the same as Alternative A.

Forests, Forest Products, Fire and Fuels

Alternative B forest management practices (i.e., no clear-cutting) would create less new available forage (i.e., no clear-cutting), but this beneficial impact to the Green Mountain HMA would be limited in effect because of low demand for forest products. However, there will be more mechanical treatments for fuels and prescribed fires under Alternative B because the alternative would use more funds for non-infrastructure range improvements. This would result in a short-term adverse impact because it would reduce the potential disturbance to and displacement of wild horses; however, it would result in a long-term beneficial impact by improving vegetative condition and reducing the potential for larger, more intense fires that would result in slower rehabilitation and ultimately a greater loss of forage. This management also could require emergency roundups if large areas burn and leave very little forage for wild horses. Alternative B would result in fewer beneficial impacts to wild horses from fire suppression activities because fire would resume its natural role in the ecosystem. This management would result in more adverse impacts to wild horses, at least in the short term, and could result in no beneficial impacts to wild horses during the planning period.

Grasslands and Shrublands

In general, management under Alternative B emphasizes the conservation and protection of resources (e.g., vegetation), which should improve forage and the health of wild horses. Therefore, management of resources under Alternative B would result in the greatest beneficial impacts to wild horses compared to the other alternatives.

Invasive Species

Alternative B includes the most aggressive treatment for INNS. There could be a short-term adverse impact to wild horses because potentially larger areas in HMAs would be treated and the treated areas might require a rest period. The long-term beneficial impact of this aggressive treatment would be a healthy, diverse vegetative community free of INNS and more forage available to wild horses.

Riparian-Wetlands

In general, management under Alternative B emphasizes the conservation and protection of resources such as riparian-wetlands, which would improve forage and the health of wild horses. Therefore, management of resources under Alternative B would result in the greatest beneficial impacts to wild horses compared to the other alternatives. Alternative B precludes fencing as part of livestock allotment management unless there would be no impacts to resources. Therefore, improvement in riparian-wetlands might be achieved more slowly than under Alternative A, which authorizes riparian-wetland fences. Fencing riparian-wetland areas to exclude grazing animals is the fastest method to achieve riparian-wetland health, but it also removes the riparian-wetlands from available wild horse forage, an adverse impact to wild horses.

Wildlife

In general, management under Alternative B emphasizes the conservation and protection of resources (e.g., wildlife), which would improve forage and the health of wild horses. Therefore, management of resources under Alternative B would result in the greatest beneficial impacts to wild horses compared to the other alternatives. Under Alternative B, if there are modifications needed to accommodate forage allocations for wildlife, livestock grazing AUMs would be reduced as part of the natural systems management discussed below for livestock grazing.

Special Status Species

Management of special status species under Alternative B would result in impacts similar to Alternative A, although to a much greater degree in the case of greater sage-grouse. Under Alternative B, 70,078 HMA acres are outside the greater sage-grouse Core Area and would not be impacted by greater sage-grouse protections. Alternative B greater sage-grouse protections close 517,280 acres of HMAs to surface disturbance, range improvement projects, and wind-energy development. There are strict limits on density and number of developments. Alternative B would be more likely than Alternative A to prevent greater sage-grouse listing under the ESA, which would result in direct and indirect beneficial impacts to wild horses.

4.4.10.3.3.3. Resource Uses

Locatable Minerals

Alternative B withdraws more than 50 percent of HMAs from locatable mineral entry. Alternative B would result in the same types of adverse impacts to wild horses as Alternative A. However, because Alternative B opens fewer acres for development, it would result in the least surface disturbance (and related habitat fragmentation, including fences) compared to the other alternatives, and would therefore result in the fewest adverse impacts to wild horses from locatable minerals management.

Leasable and Salable Minerals

Alternative B management of leasable and salable minerals, including oil and gas, would result in the beneficial impacts to wild horses would be the same for locatable minerals. Alternative B opens fewer acres to these mineral activities and would therefore involve the least surface disturbance and related habitat fragmentation and human contact compared to the other alternatives. Alternative B would result in the fewest adverse impacts to wild horses from leasable and salable minerals management.

Renewable Energy

Alternative B excludes 100 percent of HMAs with high wind potential from wind-energy development. This management would be most beneficial to the Green Mountain and Red Desert HMAs. The North Lander Complex below Beaver Rim has relatively low wind-energy potential, whereas above the Beaver Rim the potential is high. The Red Desert Complex of HMAs also has high wind-energy potential in the Green Mountain, Crooks Mountain, and Antelope Hills HMAs.

ROWs and Corridors

Alternative B affords the most protection for wild horses by limiting ROWs to existing corridors. However, existing corridors bisect the Muskrat Basin HMA and intersect a very small portion of the Green Mountain HMA. Alternative B ROW and corridor management through the Muskrat Basin HMA would result in adverse impacts the same as described for ROW and corridor management under Alternative A. Alternative B would result in more beneficial impacts than

Alternative A because Alternative B excludes the balance of the HMAs from ROWs; Alternative A allows them on a case-by-case basis.

Trails and Travel Management

Management of trails and travel under Alternative B would result in impacts similar to those under Alternative A, except regarding over-snow vehicles. Alternative A does not close HMAs to motorized vehicle traffic. Alternative B limits over-snow travel to when at least 12 inches of snow are on the ground; this would result in a major beneficial impact to wild horses because it limits the types of stresses and harassment that could occur under Alternative A.

Livestock Grazing Management

Alternative B livestock management would result in much more beneficial impact to wild horses than Alternative A. Under Alternative B, almost no spring and reservoir developments associated with livestock grazing are constructed compared to the continued development of projects under Alternative A. However, increasing herd numbers suggest that additional water sources are not needed for wild horses and that spreading livestock use to new areas and the loss of forage associated with water developments and the surrounding area where animals concentrate, would result in adverse impacts to vegetation. Therefore, Alternative B management of not building more water developments would result in at least a neutral impact and likely a beneficial impact to wild horses.

In other respects, Alternative B livestock grazing management would result in more beneficial impacts to wild horses. Establishing livestock use in allotments that would not exceed light utilization essentially means much less livestock use. Additional sustained yield forage for wild horses and wildlife would result in beneficial impacts to wild horses by increasing forage and decreasing the potential for competition with livestock and other wildlife. Not introducing additional infrastructure in HMAs would beneficially impact wild horses because no new fences (and perhaps less fencing if some fences are removed as contemplated under Alternative B) would ensure that the wild, free-roaming character of wild horses would be maintained.

Recreation

Impacts from recreation management under Alternative B would be similar to impacts under Alternative A. Alternative B establishes a number of recreation management areas, including the CDNST Destination SRMA and the National Trails Undeveloped SRMA. Recreation management stops the movement toward a more industrial setting and trends toward a more primitive setting. While it is possible that more focused recreation management would increase visitation, recreation management would limit adverse impacts to wild-horse habitat.

4.4.10.3.3.4. Special Designations

Alternative B manages 64 percent of HMAs with ACEC prescriptions that would beneficially impact wild horses. The most direct beneficial impact would be that Alternative B increases the size of the Green Mountain ACEC, putting an additional 10,248 acres of HMA in the ACEC. ACEC management under Alternative B limits surface disturbance, mineral actions, ROWs, habitat fragmentation, and other human presence, which would result in direct beneficial impacts to wild horses by improving vegetation. While Alternative B in general limits range improvement projects, it allows none in ACECs.

4.4.10.3.4. Alternative C

4.4.10.3.4.1. Program Management

Overall, the Alternative C expansion of infrastructure to support managed grazing would be anticipated to result in smaller populations of wild horses that would not be able to maintain genetic viability with the anticipated fencing and potential blockage of migration routes. Site-specific adverse impacts could result from conflict with emphasizing livestock production and providing for motorized recreational opportunities. In addition, Alternative C allows fluid mineral development on 100 percent of HMAs. Alternative C prohibits other surface disturbance, such as mineral materials disposals and solid leasable minerals activities, only in NLCS units, and within ¼ mile of greater sage-grouse leks and riparian-wetland areas. This would result in many more adverse impacts to vegetation and habitat than Alternative B.

Wild horses could slowly adapt to the increased disturbances and competition with livestock, but with confined living space, their tolerance threshold might be exceeded. Wild horses might be concentrated into smaller use areas, and increased competition for forage and water between consumptive species would occur. Wild horses could be forced outside the identified HMA and would have to be gathered more frequently and returned or removed. However, to comply with the Wild Horse and Burro Act of 1971, limitations might be placed on other uses to ensure viable populations in HMAs. Emphasis on construction of exclusion fencing to protect riparian-wetlands and other resource values would result in long-term adverse impacts to the free-roaming nature of wild horses. The objectives might not be met with viable populations of wild horses maintained in all HMAs. In some cases, primarily in smaller HMAs with fewer animals identified, conflicts with objectives to emphasize livestock production would be great. Similarly, conflicts with emphasizing recreational opportunities would confine horses to more restricted portions of each HMA. The appropriate management level might need to be reduced in some HMAs over the long term to meet all management objectives.

General management under Alternative C would result in the same level of wild-horse viewing as Alternative A, but less than Alternative B.

Alternative C does not include seasonal restrictions on surface-disturbing or disruptive activities in HMAs. This would result in long-term adverse impacts to wild horses by increasing the potential for disturbance during sensitive times of the year; which could reduce forage and overall health of horses in the HMAs. Allowing Special Recreation Permits (SRPs) in HMAs would result in impacts similar to those Alternative A, although to a higher degree because more SRPs would be issued under Alternative C.

Overall, the ability to manage for the protection of wild horses would be least under Alternative C.

4.4.10.3.4.2. Resources

Soil

Alternative C management of soil resources is the same as or slightly less restrictive than under Alternative A; therefore, impacts under Alternative C would be the same as under Alternative A.

Water

Many Alternative C management actions for water resources are the same as those under Alternative A. However, allowing permanent facilities in riparian-wetlands would result in a permanent long-term loss of forage if these kinds of activities were authorized in HMAs.

Forests, Forest Products, Fire and Fuel

Alternative C creates the most additional forage from clear-cutting and other silviculture practices in the Green Mountain HMA. There are no size limitations on cuts under this alternative. This would beneficially impact wild horses by providing high-quality forage over the long term due to the potential limited for forest products Full fire suppression and unlimited use of heavy equipment would result in adverse impacts by suppressing natural fire regimes and holding some range sites in ecological states that might not be as productive for forage. Use of heavy equipment would take some areas out of production for a short period and would produce a seed bed conducive to INNS invasion. Many of the management actions under Alternative C would be the same as management actions under Alternative A and would result in the same impacts.

Grasslands and Shrublands

Alternative C maximizes vegetative forage production for each range site and uses soil and vegetative treatments in all cases. Maximizing forage production through aggressive vegetative treatments would help reduce competition between foraging animals. Alternative C will have fewer funds available for vegetative treatments than alternatives A and B because Alternative C develops more range infrastructure.

Invasive Species

Alternative C maximizes surface disturbance, including roads and ROWs, to support increased resource use. This management is the highest vector for the introduction of INNS and would result in more indirect adverse impacts to wild horses through more INNS damage of vegetation. Alternative C would result in the greatest adverse impacts to wild horses from INNS.

Riparian-Wetlands

Maximizing range improvements to meet PFC would adversely impact wild horses because riparian-wetland areas would likely be fenced. Wild horses would not be able to access these areas, which would reduce forage and water available to wild horses. Horses would be compelled to use alternative water sources that tend to be smaller, such as stock tanks and wells. This would increase competition between livestock and wild horses for limited watering space because too many cattle could use limited water and restrict horse access. Conversely, some horses have been known to chase cattle away from water sources such as stock tanks. Furthermore, if water is limited, wild horses might leave the HMA in search of new areas in which to forage and water, potentially increasing wild-horse numbers outside the HMA and adversely affecting vegetation in new areas. Additional gathers might be needed to remove horses from outside HMAs, which would be an added expense not only in dollars, but time and management of the animals.

A potential beneficial impact to wild horses would be the availability of long-term high-quality forage and water as riparian-wetland areas approach PFC, but only if the fencing is removed, or, in some cases riparian-wetland areas could provide more water as improvement is achieved. During the non-grazing and non-growing season of some riparian-wetland pastures, horses would be allowed to graze these areas without adversely affecting vegetation during the dormant season.

Wildlife

Giving priority to livestock forage needs when allocating forage resource needs would result in adverse impacts to wild horses. Maximizing livestock forage needs might require the adjustment of appropriate management levels in HMAs downward to accommodate increased livestock use. In turn, this would reduce the genetic variability in several of the HMAs. In general, Alternative C wildlife management would result in more adverse impacts to wild horses because it is less protective of wildlife and therefore wild horse habitat. Management prescriptions for wildlife under Alternative C would result in more adverse impacts to wild horses because range developments and fences in HMAs could be constructed in wildlife migration corridors, crucial winter range, and parturition areas.

Special Status Species

Alternative C management of special status wildlife or plant species would result in impacts similar to those under Alternative A, although to a greater degree because Alternative C allows more development and surface disturbance. This is particularly true with greater sage-grouse management. Like Alternative A, Alternative C applies a ¼-mile buffer around greater sage-grouse leks rather than the Alternative B 0.6-mile buffer, which opens 19,781 acres of HMAs to surface disturbance. However, Alternative C includes more range development in the unbuffered areas. Like Alternative A, Alternative C management would accelerate the downward trend in greater sage-grouse population numbers, which would result in direct (due to loss of vegetation) and indirect (due to potential changes in herd numbers should the greater sage-grouse be listed under the ESA) adverse impacts to wild horses.

4.4.10.3.4.3. Resource Uses

Minerals

The types of impacts to wild horses under Alternative C minerals management would be the same as under Alternative A. However, impacts would be greater under Alternative C because it opens many more acres to surface disturbance rather than applying an NSO restriction, likely would result in many more roads and ROWs associated with resource use, and does not limit mineral materials disposals. See the *Fish and Wildlife Resources – Wildlife* section of this chapter for a discussion of the adverse impacts to habitat from resource use. With the most acres available to development and the fewest restrictions on that development, Alternative C would result in the most surface disturbance compared to the other alternatives, and would therefore result in the greatest adverse impacts to wild horses.

Renewable Energy

Alternative C opens a total of 555,620 acres in HMAs to wind-energy development. Impacts to wild horses from wind-energy development would be the same under Alternative A. However, with more areas open and no areas excluded from transmission lines under Alternative C, it would be more likely that wind energy could be developed in HMAs. Extensive wind-energy development in HMAs could preclude gathers and inventory, which could result in irreparable damage to the wild horses, a potential violation of protective federal legislation.

ROWs and Corridors

Alternative C would result in the same types adverse impacts to wild horses from ROW and corridor management as Alternative A. Alternative C would result in the more adverse impacts to wild horses than the other alternatives. Alternative C allows more ROWs and corridors in more locations, and includes the fewest avoidance or exclusion areas, including through HMAs.

Livestock Grazing Management

Livestock grazing under Alternative C would result the greatest adverse impact to wild horses of all the alternatives. Maximizing livestock grazing would create intense competition for forage and water resources. Increased infrastructure for water development would not provide beneficial impacts sufficient to offset the adverse impacts of shifting livestock use to upland areas that had not been utilized because of lack of water. Fencing in the HMAs would block migration routes and reduce genetic interchange between the various HMAs. Development of water outside the HMAs would draw wild horses out of the historic HMAs and would cause horse populations to increase outside their former HMAs. These animals would have to be monitored more frequently and gathered to keep animals managed in their respective HMA.

Alternative C allows the same livestock grazing level (41 to 60 percent) as Alternative A, with a managed grazing strategy. Alternative C would include more fences and their related adverse impacts to wild horses than Alternative A and substantially more than Alternative B.

Wild horses could slowly adapt to the increased disturbances and competition with livestock, but with confined living space their tolerance threshold could be exceeded (social space requirement). Wild horses could be concentrated into smaller use areas, and increased competition for forage and water between consumptive species would occur. Wild horses might be compelled to move outside the identified HMA and would have to periodically gathered and returned or removed. However, to comply with the Wild Horse and Burro Act of 1971, limitations could be placed on other uses to ensure viable populations in HMAs. Emphasis on construction of exclusion fencing to protect resource values would result in a long-term adverse impact to the free-roaming nature of wild horses.

In some cases, primarily in smaller HMAs with fewer animals identified in appropriate management levels, conflicts with objectives to emphasize livestock production would be great.

Trails and Travel Management

Alternative C trails and travel management would result in the same types of adverse impacts to wild horses as alternatives A and B, except to a greater degree. Alternative C does not limit over-snow vehicle use. In all areas, Alternative C allows travel on existing roads, which would result in more adverse impacts to wild horses than limiting travel to designated roads. Alternative B extends the limit on travel to designated roads to a larger part of the Green Mountain HMA.

Recreation

Alternative C recreation management would result in the same types of adverse impacts as Alternative A, except to a greater degree. Alternative C recreation management accelerates the trend away from more primitive recreation settings to a more urban-industrial setting occurring under Alternative A. This would result in a much more adverse impact to wild horses than Alternative B, under which the recreation setting trend would be the reverse. Long term, Alternative C recreation management would result in the most adverse impacts to wild horses of all alternatives.

4.4.10.3.4.4. Special Designations

Alternative C does not specifically designate the Green Mountain ACEC and manages the area with standard stipulations. No Plans of Operations are required for locatable mineral exploration that would disturb fewer than 5 acres. This would adversely impact the Green Mountain wild-horse herd. This management would result in adverse impacts to wild horses because there would be no protections from vehicular travel and no seasonal closures. Therefore, the horses would be subject to confrontations with humans during the winter months when horses would be stressed by severe winter weather.

4.4.10.3.5. Alternative D

4.4.10.3.5.1. Program Management

Except for livestock grazing and special designations, Alternative D wild horse management is more similar to Alternative B than to alternatives A and C. Alternative D focuses on maintenance of healthy, viable herds and habitat and emphasizes conservation of physical, biological, heritage, and visual resources with constraints on resource uses, although less so than Alternative B. Scenic loops would be established in the HMAs. Alternative D manages to protect vegetation and limits surface disturbance second only to Alternative B

Livestock grazing management under Alternative D would utilize range improvement projects pursuant to a Comprehensive Grazing Strategy to meet the Wyoming Standards for Healthy Rangelands while considering other resource values identified under Alternative B. Resource values such as wildlife winter range and migration corridors, riparian-wetland areas, and the greater sage-grouse Core Area could limit AUMs available for livestock, which would result in direct beneficial impacts to wild horses. Upland areas not used by livestock under alternatives A and B will be utilized under both alternatives C and D, with fencing and water developments utilized to alter livestock distribution.

Providing opportunities for wild horse viewing in the HMAs would have the same impacts as those described under Alternative A.

Compared to other alternatives, management actions under Alternative D would result in the second most direct and indirect beneficial impacts to wild horses and their habitat.

4.4.10.3.5.2. Resources

Soil and Water

In general, management under Alternative D emphasizes conservation and protection of soil and water and limits surface disturbance more than any alternative except Alternative B; this management would improve forage and the health of wild horses (see the *Soil*, *Water*, and *Vegetation – Grasslands and Shrubland Communities* sections of this chapter). Therefore, management under Alternative D would result in the same types of beneficial impacts to wild horses as Alternative B, but to a lesser degree. However, to the extent that Alternative D allows more surface disturbance in HMAs, including opening 60 percent more of HMAs to mineral leasing with moderate or standard stipulations than Alternative B, it would result in many fewer beneficial impacts than Alternative B, although much more than alternatives A and C.

Forests, Forest Products, Fire and Fuels

Alternative D forest management practices (i.e., no clear-cutting) would create less new forage than management under Alternative C. However, this less-beneficial impact to the Green Mountain HMA would have a limited effect because of low demand for forest products. In addition, there will be the same level of mechanical fire and fuels treatment under Alternative D as under Alternative A and less than under Alternative B because Alternative D constructs range improvement projects to support comprehensive grazing management strategies. This would result in short-term beneficial impacts to wild horses because it would reduce the potential disturbance and displacement of wild horses; however, it would result in a long-term adverse impact by not improving vegetation condition or reducing the potential for larger, more intense fires, which would result in slower rehabilitation and ultimately a greater loss of forage. This management also could require emergency roundups if large areas burn and leave very little forage for wild horses. Alternative D uses a mixed approach to fire suppression activities, which would result in short- and long-term beneficial and adverse impacts to wild horses.

Grasslands and Shrublands

In general, management under Alternative D emphasizes the conservation and protection of resources (e.g., vegetation) by limiting surface disturbance. This should improve forage and the health of wild horses. Therefore, management of vegetative resources under Alternative D would result in more beneficial impacts to wild horses than alternatives A and C and fewer beneficial impacts than Alternative B.

Invasive Species

Alternative D INNS management is approximately the same as Alternative A, although Alternative D would result in more beneficial impacts because it allows less surface disturbance and allows livestock flushing. Alternative D would treat the same number of acres as alternatives A and C and fewer than Alternative B. There could be short-term beneficial impacts to wild horses because Alternative D treats fewer areas in HMAs under Alternative B (and the treated areas could require a rest period). However, long term, Alternative D would result in fewer beneficial impacts from treatment alone. The most substantial impact to wild horses from INNS management under Alternative D would be the more limited amount of non-livestock-related surface disturbance compared to all alternatives other than Alternative B.

Riparian-Wetlands

In general, management under Alternative D emphasizes the conservation and protection of resources such as riparian-wetlands, which would improve forage and the health of wild horses, but less than management under Alternative B. Alternative D includes the same riparian-wetland setback as alternatives A and C, but closes more areas to surface disturbance in the resource use areas, resulting in beneficial impacts to riparian-wetlands. However, some of this beneficial impact would be offset by riparian-wetland management for livestock grazing. Under Alternative D, a Comprehensive Grazing Strategy will be implemented to address livestock grazing in riparian-wetland systems while considering other resource values and their needs (e.g., wild horses).

Alternative D limits the use of fencing as part of livestock allotment management to cases where resource benefits exceed adverse impacts. Therefore, improvement in riparian-wetlands might be achieved more slowly than under Alternative A, which authorizes riparian-wetland fences. Fencing riparian-wetland areas to prevent grazing is the fastest method to achieve riparian-wetland health, but it also would remove the riparian-wetlands as available wild-horse forage and a source of drinking water, an adverse impact. Project implementation could be restricted in wildlife migration corridors and HMAs, thus allowing wild horses to continue to use their HMAs as they have historically.

If removal of these riparian-wetland areas occurred, restricting wild-horse access would cause wild horses to move away from their traditional use areas to other areas inside or outside the HMA. Wild horses also would utilize development water sources such as stock tanks and wells for their drinking water needs. This increase in use of these water sources would create competition between livestock and wild horses because the watering area of the source would limited in size. Horses would chase livestock away and not allow them for instance to drink during the grazing season. Conversely, with smaller areas to water, cattle could drink all available water and not leave any available to other species such as wild horses. By not fencing these riparian-wetland areas as described for Alternative B, there would be more space for wild horses and cattle to water and freely forage, which would reduce competition between species.

Wildlife

In general, management under Alternative D emphasizes the conservation and protection of resources (e.g., wildlife), which would improve forage and the health of wild horses. Therefore, management of resources under Alternative D would result in the second greatest beneficial impacts to wild horses compared to the other alternatives (less only than Alternative B). However, unlike Alternative B, if there are modifications needed to accommodate forage allocations to wildlife, it is not likely that livestock grazing AUMs would be reduced because grazing is managed as part of a comprehensive system (see below in the discussion of livestock grazing).

Alternative D authorizes fences in migration corridors, crucial winter ranges, and parturition areas if needed to support a Comprehensive Grazing Strategy. This would result in more adverse impacts to wild horses than Alternative B and more beneficial impacts than alternatives A and C.

Special Status Species

Alternative D management of special status wildlife or plant species would result in impacts similar to Alternative B, although to a substantially lesser degree in the case of greater sage-grouse. Alternative D greater sage-grouse protections close 32,231 acres of HMAs to surface disturbance from a smaller list of activities than Alternative B (discussed below under *Resource Uses*). Alternative D applies the same limits on density and number of developments in connection with oil and gas and wind-energy development projects and transmission lines (although only in the greater sage-grouse Core Area and not nesting habitat, as under Alternative B), but applies no similar limitations on range improvement projects, solid mineral leasing, and non-energy ROWs, which would result in less-beneficial impacts to wild horses.

While Alternative D greater sage-grouse management would result in fewer beneficial impacts to wild horses than Alternative B, Alternative D management would result in substantially more beneficial impacts than alternatives A and C.

4.4.10.3.5.3. Resource Uses

Locatable Minerals

Alternative D proposes to withdraw 825 acres of HMAs from locatable mineral entry, many fewer acres than Alternative B but more than Alternative A. Alternative D would result in the same types of adverse impacts to wild horses as Alternative A. However, Alternative D opens fewer acres open to development and would result in less surface disturbance (and related habitat fragmentation, including fences) compared to alternatives A and C and would therefore result in fewer adverse impacts to wild horses.

Leasable and Salable Minerals

Alternative D management of leasable and salable minerals, including oil and gas, would result in the same beneficial impacts as management of locatable minerals. Alternative D opens fewer acres to these mineral activities than Alternative A and many fewer acres than Alternative C. Therefore, Alternative D would result in less surface disturbance and associated habitat fragmentation and human contact. Alternative D minerals management would result in many fewer beneficial impacts to wild horses than Alternative B.

Renewable Energy

As discussed under Alternative A, wind-energy development can result in short- and long-term adverse impacts to wild horses. Alternative D opens 23,365 acres of HMAs with high wind potential to wind-energy development. The beneficial impact of closing almost all high-wind-potential areas would be the greatest in the Red Desert Complex HMAs (Green Mountain, Crooks Mountain, and Antelope Hills). The North Lander Complex (Rock Creek Mountain, Dishpan Butte, Conant Creek, and Muskrat Basin) HMAs has relatively low wind-energy potential below Beaver Rim (Conant Creek and a portion of Muskrat Basin) and high potential above Beaver Rim (Dishpan Butte, Rock Creek Mountain, and Muskrat Basin HMAs). Wind-energy development that could occur in these HMAs would make gather and removal become extremely difficult because aircraft used to gather wild horses would need to negotiate and work around wind turbines in these HMAs.

ROWs and Corridors

Alternative D affords more protection for wild horses than alternatives A and C, limiting ROWs to designated corridors. However, the corridors bisect the Muskrat Basin HMA and intersect a very small portion of the Green Mountain HMA. Alternative D ROW and corridor management through the Muskrat Basin HMA would result in adverse impacts the same as described for ROW and corridor management under Alternative A. Like Alternative B, Alternative D would result in more beneficial impacts than Alternative A or C because Alternative D excludes the balance of the HMAs from ROWs; Alternative A allows them on a case-by-case basis.

Trails and Travel Management

Alternative D trails and travel management would result in beneficial impacts similar to those under Alternative B and less adverse than impacts under Alternative C.

Livestock Grazing Management

Alternative D livestock management would result in beneficial impacts to wild horses similar to Alternative B. Alternative D avoids constructing range improvement projects across the planning area without consideration of other resource values, rather than maximizing livestock use. Alternative D requires that range improvement projects be in support of a Comprehensive Grazing Strategy to achieve healthy rangelands. However, this high-risk strategy could adversely impact wild horses if it is not successful because the downside risks would be substantial (see the *Vegetation* sections of this chapter). Moreover, the strategy will disturb 620 acres associated with new fence construction and 227 acres associated with spring, reservoir, and well developments. These new water developments would draw horses away from their HMA and provide new habitat in which horses would establish. This would result in beneficial impacts to the horses, but also adverse impacts because horses would need to be inventoried and gathered more frequently outside the HMAs. The portion of new fences that could be constructed in HMAs would adversely impact wild horses and their migration from winter to summer ranges. Alternative D livestock grazing management allows range improvement projects that would adversely impact rangeland health if impacts were offset by rangeland improvements. However, there could be more adverse impacts to wild horses, particularly in upland range, than beneficial impacts from improved conditions for wild horses that do not loiter in riparian-wetland areas.

Under Alternative D, infrastructure, including riparian-wetland exclosure fences, will be utilized in some cases to achieve riparian-wetland health; however, this would adversely impact wild horses because fenced riparian-wetland areas would not be available for wild horses to forage and water in. Exclosure or pasture fencing of riparian-wetland areas would compel some wild horses to move out of the HMA to new areas in search of water and forage. This movement of horses outside the HMA would increase competition for forage and water with cattle. Livestock utilization levels under Alternative D are the same as under alternatives A and C (moderate) and would result in fewer beneficial impacts to wild horses than the light utilization under Alternative B. Upland range use by livestock will be greater under Alternative D (more like Alternative C than Alternative B because livestock distribution is spread out away from riparian-wetland areas). This would increase competition with other grazing animals such as wild horses. This would result in a less beneficial impact than Alternative B, which designates lower utilization levels and would likely have fewer livestock grazing AUMs, particularly over time.

Alternative D will develop infrastructure to support the Comprehensive Grazing Strategy. Fences are allowed in wildlife (and wild horse) migration corridors, crucial winter range, and parturition areas if needed to support the Comprehensive Grazing Strategy. However, such fences would need to be mitigated through design features that allow wild horses to freely migrate or move in and out of the areas. This impact would be similar to but lesser than Alternative C and much more adverse than Alternative B.

Recreation

Impacts from recreation management under Alternative D would be similar to those under Alternative B. Alternative D establishes a number of recreation management areas, including the CDNST Destination SRMA and the National Trails Undeveloped SRMA. Recreation management would stop the movement toward a more industrial setting and trend toward a more primitive setting. While it is possible that more focused recreation management would increase human visitation, recreation management would limit adverse impacts to wild horse habitat.

4.4.10.3.5.4. Special Designations

Alternative D manages 52,427 acres of HMA as ACECs, with management prescriptions that would beneficially impact wild horses. The most direct impact would result from the increased size of the Green Mountain ACEC, which puts 6,777 more acres of HMA into the ACEC than Alternative A. ACEC management under Alternative D limits surface disturbance, mineral actions, ROWs, habitat fragmentation, and other human presence; this would result in direct beneficial impacts to wild horses and indirectly beneficial impacts by improving vegetation, although less so than under Alternative B. For wildlife ACECs such as Green Mountain, Alternative D allows range improvement projects only if they would benefit wildlife, which would also beneficially impact wild horses.

Alternative D manages Congressionally Designated Trails in the Antelope Hills and Crooks Mountain HMAs. Beneficial impacts wildlife from Congressionally Designated Trails management would be similar to beneficial impacts from ACEC management.

4.5. Heritage and Visual Resources

4.5.1. Cultural Resources

Cultural resources are defined as the places where the physical remains of past peoples can be found. If these remains are determined to be important, federal regulations require that effects to the resources be assessed and mitigation measures be instituted to help protect them.

Adverse impacts to cultural resources typically result when there is a loss of information and/or a loss of integrity of the resource. Impacts on significant prehistoric, historic, and spiritual/sacred/traditional cultural resources on BLM-administered lands can include actions that physically damage or destroy all or parts of a resource; actions that alter a significant element of a resource; actions that introduce visual, atmospheric (air), or audible (noise) elements that can diminish the historical integrity of a resource; or a lack of action that causes a resource to deteriorate. Increased access to areas that contain cultural resources can result in increased use, erosion, looting, and vandalism, all adverse impacts.

Actions that cause physical damage or destruction, or neglect, generally result in adverse impacts to cultural resources significant for their scientific-data potential; prehistoric campsites often fall into this category. Adverse impacts to these types of resources are considered long-term, because once the resources are damaged or disturbed, impacts cannot be reversed.

All the actions identified above can adversely affect cultural resources significant for their important historical associations, their unique architectural, artistic, or representational characteristics, or their important spiritual and/or religious associations. Prehistoric and historic sites such as Castle Gardens, the Oregon Trail, the Rawlins-Fort Washakie Stage Trail, Rocky Ridge, Martin’s Cove, and Miner’s Delight Townsite are some of the sites in this category. Adverse impacts to these types of resources can be short-term and long-term, because some of impacts could be reversed, while others could not.

Finally, all types of actions can adversely affect cultural resources significant for their spiritual, sacred, and/or traditional values. Prehistoric and historic sacred sites such as Cedar Ridge, Castle Gardens, burials, and Martin’s Cove are some of the sites in this category. Adverse impacts to these types of cultural resources would be mostly long-term, because Native American groups consider such impacts to have a permanent impact on the spiritual nature of the sites.

Beneficial impacts on cultural resources result from special management measures that enhance the quality of a resource or its surroundings. Stabilization and repair of historic structures at Miner’s Delight, stabilization at rock art sites and inscription sites like Castle Gardens and Devil’s Gate, and fencing at grave sites such as the Miner’s Delight Cemetery are examples of beneficial impacts. Erosion control measures on the Oregon Trail and at some prehistoric and historic campsites are also examples of beneficial impacts. Most of these beneficial impacts would be long-term, but eventually, more measures will be required to prevent natural and/or human influences from degrading these resources.

4.5.1.1. Summary of Impacts

Impacts to cultural resources would vary by alternative. Alternatives A and C are similar in their protections, but Alternative A generally provides more protections than Alternative C. Alternative B provides greater protection for cultural resources than alternatives A and C, but somewhat less protection than Alternative D. As for specific resources, Warm Springs Canyon Flume is somewhat protected under Alternative A, well protected under alternatives B and D, and minimally protected under Alternative C. Spiritual/sacred/traditional sites receive similar protections under all alternatives, although management would be more effective under alternatives B and D and slightly less effective under Alternative C.

The number of sites various actions would affect correlates directly with the degree, nature, and quantity of surface-disturbing and other disruptive activities in the planning area. In this regard, Alternative C would result in the most surface disturbance and Alternative B the least.

Under all alternatives, the BLM continues its obligation to conduct government-to-government consultations with interested tribes. Actions required by the NHPA and the Wyoming State Protocol Agreement will form the foundation of all project-specific decisions regarding cultural resources under all alternatives. Conflicts between cultural resources and other resource uses not covered by this RMP will generally be resolved by the Wyoming State Protocol Agreement and NHPA provisions. However, Alternative C would require the most consultation with the State Historic Preservation Officer (SHPO) because more surface-disturbing activities would occur under that alternative.

4.5.1.2. Methods and Assumptions

The degree of adverse impacts to sites and the total number of sites adversely impacted in the planning area is directly correlated to the amount of surface-disturbing or other disruptive activities allowed under each alternative. Cultural resources would be increasingly adversely impacted as the amount of resource use increases. Reduction or elimination of land uses in a particular area would benefit cultural resources through a reduction in direct and indirect impacts to the resources.

All authorizations for land and resource use must comply with all relevant cultural resource laws, regulations, protocols, and policies. Protection of cultural resources must also conform to SHPO coordination requirements, with input from the local public, other interested parties, and Native American groups.

A cultural resource inventory, evaluation of site NRHP eligibility, and assessment of potential impacts from federal actions are required by law before the initiation of most surface-disturbing and other disruptive activities. This generally requires a Class III intensive field inventory of the affected area. This allows for prescriptive mitigation of impacts through avoidance or other measures where necessary, and minimizes or eliminates the potential for unmitigated impacts to cultural resources. In areas with high potential for buried resources, construction monitoring and open trench inspection are some of the methods used to discover and protect cultural resources not apparent from surface inventories.

Cultural resources are evaluated according to their significance under NRHP criteria. If cultural resources are found to be eligible for inclusion on the NRHP, they are managed for preservation of their important values. Conversely, if the resources are found to be not eligible for inclusion on the NRHP, they are, in most cases, not managed or preserved. Depending on the nature of their value, eligible resources are managed through avoidance and preservation, or if that is not feasible, through data recovery, intensive recordation, or interpretive/education mitigation.

Some significant cultural resources include the historical settings around them. For example, historic trails, sites, battlefields, disaster scenes, and sacred sites can contain intact settings, in which the landscape still retains much of the character it had when the historic events occurred. These historical settings are often considered an important component of the cultural resource, and can be included in consideration of potential impacts to the resource.

Certain projects, due to size or topography, could require consideration of visual intrusions into the setting beyond the foreground or middle-ground zones to comply with NHPA Section 106.

For historic trails (excluding NHTs which are discussed under *Special Designations*), direct and indirect impacts can result from a variety of natural and human-caused actions, such as those that physically alter, damage, or destroy all or part of the trail; improved access, which brings increased use to an area, altering characteristics of the surrounding environment that contribute to the trail’s importance; the introduction of visual or audible elements out of character with the trail or that alter its historic setting; and neglect of the trail to the extent that it deteriorates or is destroyed.

Recognizing that historic trails often comprise numerous routes rather than a single trace, all protective zones are measured from the outer edges of the trails rather than from the center line.

Under all alternatives, the BLM encourages opportunities to cooperate with private landowners to minimize or eliminate disturbance to historic trails.

4.5.1.3. Detailed Analysis of Alternatives

4.5.1.3.1. Impacts Common to All Alternatives

Cultural resources in the planning area frequently experience adverse impacts. There are many different causes for these impacts, including surface disturbance, overuse, introduction of elements out of character with the resource, neglect, erosion, natural deterioration, and looting and vandalism. Surface disturbance is by far the most common adverse impact to cultural resources, especially in areas of industrial development.

Standard procedures have been developed to help address adverse impacts to significant cultural resources and guide cultural resources management under all alternatives. Standard BLM cultural resource management and protection procedures, guided by cultural resource laws such as NHPA, Archeological Resources Protection Act (ARPA), and Native American Graves Protection and Repatriation Act, include archival research, on-the-ground inventories, site recordation and evaluation, consultation with Native American groups, avoidance, data recovery excavations, condition assessments, stabilization, and historical research. These standard procedures protect many cultural resources from damage. If protection is not feasible, these standard procedures provide for the collection of data related to the site.

However, standard procedures sometimes do not protect all types of cultural resources. Development projects can indirectly affect resources where setting is important. Projects that intrude on important historical settings can affect connected historic trails or sites. For example, a modern powerline built near the Oregon Trail would adversely impact the historical setting of the trail and would adversely affect its historical integrity.

Another issue is that standard procedures do not identify all cultural resources before they experience adverse impacts, which can happen when cultural resources are below ground level and not visible from the surface. These resources are often discovered only after surface-disturbing activities have uncovered them, and construction activities can quickly and severely affect them, with data lost in the process. This type of impact occurs regularly in the planning area because sites thousands of years old are often buried by sand and soil. In these cases, mitigation usually entails data recovery and salvage excavations. These excavations are designed to retrieve the remaining data from the site and study it to reconstruct what occurred there in the past.

The standard procedures mentioned above also do not apply to small locatable minerals exploration. Locatable minerals projects affecting fewer than 5 acres are subject to the 43 CFR 3809 “Notice of Intent” regulations, which offer minimal protections to cultural resources. These operations do not require BLM approval and can result in adverse impacts to cultural sites if necessary for mining operations to proceed.

Increased public use of lands can also result in adverse impacts. Increased public use occurs due to improved access to formerly remote areas, such as areas where development creates new roads, or the use of OHVs to access formerly remote areas. A third cause is increased public interest in specific historic sites or areas. As public use increases from all these causes, so do impacts to cultural resources. As more use occurs, more cultural resources are visited or driven over, and some of the resources are looted or vandalized. This adverse impact would occur under any of the alternatives because access, OHV use, and public use and interest are all expected to increase.

Because certain cultural resources in the planning area (such as the NHTs, the South Pass Historic Mining Area, Castle Gardens, Cedar Ridge, and the RHT&EHs) have been identified or nominated as special designations (Congressionally Designated NHTs and ACECs), they are addressed under the *Special Designations* section rather than here.

4.5.1.3.2. Alternative A

4.5.1.3.2.1. Program Management

When development projects are proposed that could adversely affect cultural resources, reactive cultural resource management uses the standard procedures (as devised under the NHPA and the Wyoming State Protocol Agreement) to protect important cultural resources. Proactive management protects important resources that are not threatened by development, but still require measures to maintain or enhance their significant qualities. Alternative A uses reactive management to address impacts on a case-by-case basis, and uses proactive management to address impacts to sites such as Warm Springs Canyon Flume and some rock art sites. Proactive management is necessary to protect or stabilize these sites and maintain their important qualities, which are threatened by natural or human-caused actions. Alternative A does not manage the Beaver Rim area with an MLP.

4.5.1.3.2.2. Resources

Air quality management under Alternative A would result in no or minor adverse impacts to cultural resources where setting is an important characteristic. Efforts to maintain air quality around sites with historic settings would help maintain their important qualities, but if degradation occurs, it would adversely impact these sites. As a result, there would be no or a minor adverse impact to Warm Springs Canyon Flume and to known spiritual/sacred/traditional sites in the planning area. Slope and riparian-wetland setbacks would beneficially affect cultural resources by limiting surface disturbance. The scale of beneficial impacts can be quantified only on a site-specific basis.

All alternatives are the same in limiting the use of heavy fire equipment for the protection of cultural resources. Alternative A uses a case-by-case method of determining whether to use full suppression. Alternative A management of wildfires would be unlikely to effectively protect cultural resources because information about the locations of cultural resources that could be damaged or destroyed is not readily available to fire personnel. Resource advisors are engaged for the management of some fires, but they cannot be everywhere on fires as they happen. The fire and fuels program has been notified about the presence of Warm Springs Canyon Flume, and it would be adequately protected from the impacts of surface disturbance and wildfire. However, spiritual/sacred/traditional site information is kept confidential and not disseminated to other programs; therefore, such sites are subject to adverse impacts.

VRM Class ratings that protect natural viewsheds also protect cultural resource sites where setting is considered important. The 1987 RMP includes a few areas that protect visual settings of cultural resources (some of the Lander Slope, South Pass, Dubois, Green Mountain, and the Sweetwater River area), but most of the planning area is not protected in this way. Warm Springs Canyon Flume and some known spiritual/sacred/traditional sites are in VRM Class III areas, which offers some limited protection for their historical/natural settings. Other sacred sites are in VRM Class IV areas, where surface-disturbing activities with the potential to result in moderate to major adverse impacts could occur.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide would additional protections from surface-disturbing activities for cultural resources.

4.5.1.3.2.3. Resource Uses

Alternative A provides mostly minimal protection from locatable mineral exploration, except where there are withdrawals or ACECs. Locatable mining regulations do not follow the standard cultural resource protection measures described above and, unless the exploration project covers more than 5 acres of disturbance or is in an ACEC, cultural resources are subject to little protection from the impacts of mining. Alternative A withdraws 23,114 acres from locatable minerals exploration and retains all existing ACECs, which would protect some cultural resources. Known spiritual/sacred/traditional sites are minimally protected under Alternative A and subject to adverse impacts from mining; however, the likelihood for locatable mineral exploration around most of these sites is low. The Warm Springs Canyon Flume site is mostly withdrawn from mineral entry, which protects it from the adverse impacts of locatable minerals exploration.

Under Alternative A, leasable fluid minerals activities are at BLM discretion; therefore, there would be better controls on impacts to cultural resources than for locatable minerals. Standard procedures under this program (see *Impacts Common to All Alternatives*) provide for minor to moderate protection of cultural resources, especially those resources important for their data potential. Field inventories, resource evaluations, and impacts mitigation are routinely performed for these types of projects, and most cultural resource sites are adequately protected from direct adverse impacts. However, protection of certain sites, such as historic sites with significant historic settings or spiritual/sacred/traditional sites, can be a problem. Alternative A manages these sites on a case-by-case basis, and protection measures usually focus on reducing impacts, rather than preventing them. This is the case for spiritual/sacred/traditional sites, and several of these sites are in areas with high potential for oil and gas. However, Warm Springs Canyon Flume is protected because 557 acres around it are protected with Category 4 restrictions.

There are no special management prescriptions for the cultural resources in the Beaver Rim area and there is no requirement to conduct tribal consultation even for those oil and gas activities very near to known cultural sites. As a consequence, adverse impacts may occur, particularly for sites that would be important to Native Americans.

Leasable solid minerals and mineral materials disposals, such as phosphates, zeolites, sand, and gravel, are different from fluid minerals because impacts to cultural resources from these resource uses depend largely on the location of the minerals near the surface. If a significant cultural resource is in or near an exposure to be explored, the likelihood of adverse impacts to the resource would be high. In addition, it is much more difficult to protect the historical settings of sites from solid minerals exploration. Exploration and mining operations cannot easily be hidden, and can affect the historical settings of resources. Most of the planning area is open to phosphate leasing, although with some surface limitations that would moderately benefit cultural resources. The Warm Springs Canyon Flume site area is mostly closed to phosphate leasing under Alternative A, and no known spiritual/sacred/traditional sites are near known leasable solid minerals exposures; therefore, no impacts to known cultural resources from this type of activity would be expected. Warm Springs Canyon is mostly closed to phosphate leasing, but spiritual/sacred/traditional sites are not, and those resource could be subject to adverse impacts.

Highly visible ROW projects such as industrial wind-energy developments and large transmission lines can adversely impact cultural resources in several ways. Standard procedures cover direct impacts to resources important for their data potential, but the large size of these projects can easily adversely affect sites where setting is important. For example, an industrial wind-energy development or gas plant near a sacred site would result in a major impact to the site’s value to Native American groups. Similarly, a dam along Warm Springs Creek would result in a major impact to the flume’s historical setting. Alternative A does not include protections from these types of projects for Warm Springs Canyon Flume or known spiritual/sacred/traditional sites. The potential for large industrial plants and transmission lines near some of the known spiritual/sacred/traditional sites would be high under this alternative. Conversely, the potential for highly visible projects near Warm Springs Canyon Flume would be low. *Special Designations* below addresses the protection of cultural resources in ACECs from adverse impacts of ROW development.

Recreational activities on public lands have increased since the current RMP was implemented in 1987 and impacts to cultural resources have risen accordingly. Low levels of surface artifact collection and illegal digging of sites is an ongoing problem. Although a law enforcement ranger is stationed at the Lander Field Office, enforcement is difficult in a 2.4 million-acre planning area. Therefore, under Alternative A, impacts to cultural resources from recreational activities would result in moderate impacts to cultural resources.

4.5.1.3.2.4. Special Designations

Alternative A includes nine ACECs and Congressionally Designated Trails, and limits surface disturbances in various ways, including NSO restrictions for oil and gas development, mining Plans of Operation, and avoidance of major ROWs. These prescriptions indirectly protect cultural resources. Significant historic settings are protected to a certain extent, depending on the size of the protected area. Alternative A would result in moderate to major beneficial impacts to cultural resources in ACECs and within ¼ mile of Congressionally Designated Trails. Beyond ¼ mile of Congressionally Designated Trails, however, little protection is given to the setting. In addition, neither Warm Springs Canyon Flume nor any known spiritual/sacred/traditional sites are in existing ACECs, Congressionally Designated Trails, or NWSRS-eligible waterway segments.

Alternative A has standard stipulations only in the proposed expanded Beaver Rim and Green Mountain ACECs. This management has the potential of allowing adverse impacts to cultural resources in those area, particularly if tribal consultation is not conducted.

4.5.1.3.3. Alternative B

4.5.1.3.3.1. Program Management

Alternative B includes more proactive steps to manage cultural resources than Alternative A. Implementation of this alternative would prevent more adverse impacts to important cultural sites in the planning area, including a wider range of sites where setting is important and spiritual/sacred/traditional sites. Alternative B provides more protections to Warm Springs Canyon Flume and known spiritual/sacred/traditional sites.

4.5.1.3.3.2. Resources

Alternative B specifies that air quality management will reduce emissions and improve air quality. This action would beneficially impact cultural resources, including setting, more than Alternative A.

Restrictions on surface-disturbing activities for the protection of lands with wilderness characteristics under Alternative B provides additional protections for cultural resources. Alternative A does not apply these restrictions; therefore, Alternative B would be more beneficial than Alternative A for cultural resources in the Little Red Creek Complex.

Alternative B specifies full fire suppression near identified cultural sites to protect them from the impacts of fire. Identifying cultural resources in advance and making the fire program aware of their locations would be more protective of important resources than Alternative A, and would prevent adverse impacts from fire suppression.

Alternative B manages approximately 1 million more acres of BLM surface as VRM Classes I and II than Alternative A, and protects more cultural resources from the introduction of modern visual intrusions. This would especially protect more sites where setting is considered important and would result in major beneficial impacts to cultural resources. Alternative B manages Warm Springs Canyon Flume with VRM Class II prescriptions, which would better protect the historic settings of this site than would prescriptions under Alternative A, which allows more surface disturbance and visual intrusions. However, no known spiritual/sacred/traditional sites would be protected, because none are in VRM Class I and II areas. Therefore, the impacts under Alternative B to these types of sites from VRM would be the same as Alternative A.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are greatest under Alternative B, which would provide additional protections for cultural resources and reduce adverse impacts.

4.5.1.3.3.3. Resource Uses

Alternative B proposes to withdraw 1,609,491 more acres of mineral estate from locatable mineral entry than Alternative A, and protects more cultural resources from potential disturbances than Alternative A. This would protect more cultural sites where setting is considered important. While not all of the area withdrawn under Alternative B has high potential for locatable mineral, the withdrawal would preclude any kind of surface disturbance from mining, which would result in a major beneficial impact to cultural resources and their settings. Alternative B withdraws 283 more acres from locatable minerals around Warm Springs Canyon Flume than Alternative A, which would better protect the historic setting around the flume. Some known spiritual/sacred/traditional sites are in withdrawn areas and would be protected, but some are not and would be subject to potential adverse impacts. However, the likelihood of locatable mineral exploration around these unprotected spiritual/sacred/traditional sites would be low. New withdrawals would not apply to existing claims, because this management would not change preexisting rights.

Alternative B closes leasing for fluid minerals (oil and gas) exploration on 1,851,349 more acres of surface than Alternative A, and would protect more cultural resources from potential disturbances than Alternative A. This would especially protect more sites where setting is considered important. Under Alternative B, some known spiritual/sacred/traditional sites are in NSO areas and would be protected (not the cause under Alternative A), but some are not and would be subject to more impacts because they are in areas with high potential for oil and gas.

Leasable solid minerals and mineral materials are more restricted under Alternative B. Alternative B closes approximately 2 million acres to these uses, while Alternative A closes approximately 229,014 acres to mineral materials development and 154,106 acres to phosphate development. Closure under Alternative B is a more specific prescription than the ambiguous surface disturbance limitations found under Alternative A, resulting in major beneficial impacts to cultural resources because the areas closed under Alternative B have the best potential for phosphate. Most known spiritual/sacred/traditional sites and Warm Springs Canyon Flume are closed from mineral material disposal and phosphate leasing under Alternative B, so these sites would not be subject to adverse impacts.

Alternative B restricts wind-energy development, mines, power and gas plants, and major ROWs to a much greater extent than Alternative A. Alternative B protects most cultural resources in the planning area from the impacts of wind-energy development, large mines, and ROW impacts, including Warm Springs Canyon Flume and known spiritual/sacred/traditional sites, and would result in major beneficial impacts to cultural resources.

Impacts from recreation management would generally be the same under Alternative B as under Alternative A. To the extent that some recreation areas are closed to motorized travel or cross-country nonmotorized vehicle use, this would beneficially impact cultural resources.

4.5.1.3.3.4. Special Designations

Alternative B limits surface disturbance in ACECs, Congressionally Designated Trails, and NWSRS-eligible and suitable waterway segments, including the application of NSO restrictions for oil and gas development, requirements for mining Plans of Operation, and avoidance of major ROWs. These management prescriptions would protect cultural resources. Significant historic settings are protected to a moderate to major extent as well, depending on the size of the protected area. Under Alternative B, a 1,325,818 acre increase in acres with surface protections as a result of special designations would result in major beneficial impacts to cultural resources in specially designated areas. This would enhance the protection of cultural resources in several parts of the planning area. However, neither Warm Springs Canyon Flume nor any known spiritual/sacred/traditional sites would be protected in this manner because none of them are in existing or proposed ACECs, Congressionally Designated Trails, or WSRs.

4.5.1.3.4. Alternative C

4.5.1.3.4.1. Program Management

Alternative C has less proactive management than Alternative A. The minimum actions necessary to comply with regulations will be applied to cultural resources, which would result in more adverse impacts to several types of heritage resources than Alternative A. Alternative C provides some protections for Warm Springs Canyon Flume and spiritual/sacred/traditional sites, but deterioration would be expected to continue at a low level. Only standard oil and gas stipulations are applied and not areas are avoided for ROWs.

4.5.1.3.4.2. Resources

Air quality management and fire management are the same under Alternative C as under Alternative A, and would result in the same impacts to cultural resources. However, Alternative C would result in more adverse impacts to cultural resources than Alternative B. Like Alternative A, air quality management under Alternative C would result in little to no adverse impacts to cultural resources where setting is an important characteristic.

Alternative C classifies 179,138 fewer acres as VRM Classes I and II than Alternative A, and protects fewer cultural resources from the introduction of modern visual intrusions. Alternative C would result in more adverse impacts to cultural resources than Alternative A, especially for sites where setting is considered important. Warm Springs Canyon Flume and all known spiritual/sacred/traditional sites are in VRM Class IV areas, which would provide little or no protection for the historic/natural settings of these sites.

Because Alternative C places more of an emphasis on resource use, there are fewer restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations). Therefore, there would be more adverse impacts to cultural resources under Alternative C than under alternatives A and B.

4.5.1.3.4.3. Resource Uses

Alternative C provides minimal protection for cultural resources from locatable mineral exploration. This alternative proposes to withdraw 23,114 fewer acres of federal mineral estate from locatable mineral entry than Alternative A, and protects fewer cultural resources from potential disturbances. Locatable mining regulations do not follow the standard cultural resource protection measures previously described and, unless the mining exploration covers more than 5 acres of disturbance, cultural resources would be subject to little protection from mining impacts. Even for mining disturbance of more than 5 acres, the BLM has the authority only to require no "undue or unnecessary" degradation in reviewing the Plans of Operation. Because Alternative C does not include any ACECs, lands in ACECs designated under Alternative A would not be subject to Plans of Operation protections. Therefore, Warm Springs Canyon Flume and any known spiritual/sacred/traditional sites would be only minimally protected from the impacts of locatable mineral exploration under Alternative C. However, the likelihood for locatable mineral exploration around most of these sites would be low.

Alternative C authorizes leasing on 13,207 more acres for fluid minerals (oil and gas) exploration than Alternative A. This would protect fewer cultural resources from potential disturbances than Alternative A. Alternative C also would result in more adverse impacts to sites where setting is considered important. Warm Springs Canyon Flume and all known spiritual/sacred/traditional sites are open with moderate constraints and potentially open to adverse impacts, especially because several known spiritual/sacred/traditional sites are in areas with high potential for oil and gas. Since there is only standard need to conduct tribal consultation, Alternative C would have the same impacts to cultural resources as Alternative A. Far more areas are open to oil and gas leasing than under Alternative B, so that the adverse impacts from oil and gas operations would be far more likely to occur. However, Warm Springs Canyon Flume is in an area with very low potential for oil and gas, so the likelihood of impacts to that site from fluid minerals exploration would be low.

Leasable solid minerals and mineral materials are less restricted under Alternative C than under Alternative A. For phosphates, Alternative C closes 32,255 fewer acres. For mineral materials, Alternative C closes 87,605 fewer acres. Known spiritual/sacred/traditional sites in places such as the Lander Slope would not be protected under Alternative C and would be subject to adverse impacts, especially from mineral materials disposal or phosphate leasing. However, Warm Springs Canyon Flume is closed from mineral material disposal and phosphate leasing.

Alternative C restricts wind-energy development, mines, and major ROWs to a lesser extent than Alternative A, which would adversely impact heritage resources. This alternative protects only a few cultural resources in the planning area from the impacts of wind-energy development and major ROWs; Warm Springs Canyon Flume and known spiritual/sacred/traditional sites are not protected under Alternative C and would be subject to adverse impacts. The potential for large industrial plants and transmission lines near some of the known spiritual/sacred/traditional sites would be high; the potential for highly visible projects near Warm Springs Canyon Flume would be low.

Under Alternative C, impacts to cultural resources from recreation management would be the same as under Alternative A.

4.5.1.3.4.4. Special Designations

Alternative C does not include any ACECs or recommend any waterway segments as suitable for inclusion in the NWSRS. This opens the ACEC areas and waterway segment corridors to development; impacts to cultural resources would be more likely under this alternative. Some of the areas protected as ACECs under alternatives A and B are known to contain heritage resources, so this loss of protection would be an adverse impact. Under Alternative C, Congressionally Designated Trails are generally protected to ¼ mile on each side, except for locatable minerals. For locatable minerals, this alternative removes withdrawals and opens the lands along NHTs to unrestricted mining. Alternative C manages WSAs the same as Alternative A, which would limit surface disturbances in these areas and indirectly protect cultural resources through avoidance. Sites where setting is important would not be protected, except for NHTs, and neither Warm Springs Canyon Flume nor any known spiritual/sacred/traditional sites would be protected.

Alternative C applies no special management to the Beaver Rim or Green Mountain expanded areas, so adverse impacts to cultural resources would likely occur, particularly in the area of the Rim itself.

4.5.1.3.5. Alternative D

4.5.1.3.5.1. Program Management

Alternative D includes more proactive management of cultural resources than alternatives A and C, but less than Alternative B. This alternative would better prevent impacts to important sites than management under Alternative A, including a wider range of sites where setting is important and where spiritual/sacred/traditional sites are present. Alternative D includes more protections to Warm Springs Canyon Flume and known spiritual/sacred/traditional sites, although not to the same degree as Alternative B. Alternative D requires tribal consultation if oil and gas operations will disturb lands near sacred and Native American sites.

4.5.1.3.5.2. Resources

Like alternatives A and C, Alternative D specifies that air quality management will minimize adverse impacts to air quality, but will allow emissions up to current air quality standards. This is the minimum management level; it will result in more adverse impacts to cultural resources than Alternative B, which would result in more beneficial impacts to cultural resources, including setting. To the extent that particulate matter is caustic, such as calcium chloride used on road surfaces, fugitive dust from development activities and transportation could adversely impact cultural resources such as rock art.

Alternative D management of soil and water is generally the same as Alternative A in terms of limiting surface disturbance; therefore, it would result in the same beneficial and adverse impacts to cultural resources. There would be fewer beneficial impacts under Alternative D than under Alternative B and somewhat more than under Alternative C.

Restrictions on surface-disturbing activities for the protection of lands with wilderness characteristics under Alternative D would provide additional protections for cultural resources that would not result under Alternative A or C. Therefore, impacts under Alternative D would be more beneficial than under Alternative A. Although Alternative D manages a smaller area as non-WSA lands with wilderness characteristics to protect wilderness characteristics than Alternative B, 4,954 acres versus 5,490 acres, it is not likely that this difference would result in substantially different impacts. This is because the areas excluded under Alternative D would be managed to support the wilderness characteristics of not only the Little Red Creek Complex but also the Whiskey Mountain ACEC. Alternative D would result in substantially more beneficial impacts than Alternative C. Not only does Alternative C not manage for wilderness characteristics, it also protects only the bighorn sheep habitat on Whiskey Mountain with standard stipulations (see *Special Designations*); therefore, there would be no “spill-over” protections for the Little Red Creek Complex.

Alternative D specifies that the full range of fire suppression tactics be used based on resources at risk. This would result in somewhat fewer beneficial impacts than Alternative B or Alternative C, which use full suppression and rely on informing firefighters in advance of at-risk cultural resources. Alternative D would be likely to result in more beneficial impacts than Alternative A, which operates on a case-by-case basis and includes no advance notification for at-risk cultural resources. Identifying cultural resources in advance and having the fire program aware of their locations would be more protective of important resources than Alternative A, and would prevent adverse impacts from fire suppression activities. However, full suppression could result in long-term adverse impacts to cultural resources to the extent that this management technique increases the potential for landscape-level fire, which would exceed fire suppression efforts to protect cultural resources.

Alternative D classifies approximately 1 million more acres of BLM surface as VRM Classes I and II than Alternative A, and would protect more cultural resources from the introduction of modern visual intrusions. This would be especially beneficial to sites where setting is considered important. Warm Springs Canyon Flume is in a VRM Class II area under Alternative D, which would better protect the historic settings of this site than would alternatives A and C. However, no known spiritual/sacred/traditional sites would be protected because none are in Class I or II areas. For these types of sites, the impacts of Alternative D would be the same as under Alternative A.

Alternative D protections for riparian-wetland resources are the same as Alternative A, slightly more restrictive than Alternative C, and substantially less restrictive than Alternative B. Therefore, Alternative B would result in the most beneficial impacts to riparian-wetland areas, areas with high potential for cultural properties, than any other alternative. Alternative D, like alternatives A and C, would result in more adverse impacts to cultural resources by allowing surface-disturbing activities on approximately 125,403 more riparian-wetland acres than Alternative B.

In general, restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological, and visual resources) are greatest under Alternative B, with alternatives A, C, and D providing substantially fewer protections for cultural resources.

4.5.1.3.5.3. Resource Uses

Alternative D proposes to withdraw 19,709 more acres of mineral estate from locatable mineral entry than Alternative A. Alternative D protects more cultural resources from potential disturbances than Alternative A, much more than Alternative C, and substantially fewer than Alternative B. Withdrawals protect more sites where setting is considered important. Around Warm Springs Canyon Flume, Alternative D proposes to withdraw the same number of acres from locatable minerals as alternatives A and C, and 283 fewer than Alternative B. This would result in more adverse impacts to the historic setting around the flume than Alternative B, but the low mineral potential could make this impact less substantial.

Some known spiritual/sacred/traditional sites are in withdrawn areas and are protected under Alternative D, but many fewer than under Alternative B. The likelihood of locatable mineral exploration around these unprotected spiritual/sacred/traditional sites would be low, but in a few cases it is possible and would result in a substantial risk of adverse impacts. However, the beneficial impacts of the new withdrawals would not apply to areas with existing mining claims, because this management would not change preexisting rights. However, over time the claims could expire and then be withdrawn.

Alternative D closes 84,878 more acres of mineral estate to fluid minerals leasing than Alternative A, 109,936 more acres than Alternative C, and 2,169,511 fewer acres than Alternative B. Closing an area to surface use protects cultural resources from potential disturbances, especially where setting is considered important. Under Alternative D, some known spiritual/sacred/traditional sites are in NSO areas and are protected, but some are not and would be subject to more adverse impacts because they are in areas with high potential areas for oil and gas. In comparison, no spiritual/sacred/traditional sites would be protected under alternatives A and C, and more such sites would be protected under Alternative B. Areas managed as closed or NSO under Alternative D to protect wildlife (the Dubois area and the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area) also are areas with high potential for cultural resources.

Alternative D management of the important parturition areas on the south side of the Green Mountain ACEC and Beaver Rim will beneficially impact the cultural resources in the area. Requiring tribal consultation would avoid adverse impacts to Native American sites.

Leasable solid minerals and mineral materials disposals are less restricted under Alternative D than Alternative B, but more than under alternatives A and C. Management to protect greater sage-grouse under alternatives A, C, and D does not preclude solid mineral leasing or mineral materials disposals in greater sage-grouse Core Area. Alternative B prohibits these actions within 3 miles of a lek, which would protect 1,237,397 more acres. Alternative D closes 1,017,275 acres to mineral materials disposals and 958,743 acres for phosphate development, while under Alternative A, approximately 229,014 acres are closed to mineral materials disposals and 154,106 acres are closed to phosphate development. Most known spiritual/sacred/traditional sites and Warm Springs Canyon Flume are closed to mineral materials disposals and phosphate leasing under Alternative D; therefore, those sites would not be subject to adverse impacts.

Alternative D restricts wind-energy development, mines, power plants, gas plants, and major ROWs to a much greater extent than Alternative A, substantially more than Alternative C, and less than Alternative B. Alternative D protects many cultural resources from the impacts of wind-energy development, large mines, and ROWs, including Warm Springs Canyon Flume and known spiritual/sacred/traditional sites, although to a lesser extent than Alternative B.

Impacts from recreation management would be the same under Alternative D as under Alternative A, except that Alternative D, like Alternative B, withdraws Johnny Behind the Rocks. Alternatives A, B, and D recreation management would result in more beneficial impacts to cultural resources than Alternative C, which favors development over recreation.

4.5.1.3.5.4. Special Designations

ACECs, Congressionally Designated Trails, NWSRS-eligible waterway segments recommended as suitable WSRs, and WSAs in the planning area limit surface disturbances in various ways. These limits include NSO for oil and gas development, mining Plans of Operation, and ROW avoidance. These prescriptions protect cultural resources through avoiding disturbances to cultural resources in those areas. Significant historic settings are protected to a certain extent as well, depending on the size of the protected area. Under Alternative D, 245,037 acres of ACECs close or limit surface disturbance, 5 percent more of the planning area than Alternative A, but 52 percent less of the planning area than Alternative B. Alternative C does not include any ACECs, and therefore only standard stipulations on surface disturbance, which would result in substantially more adverse impacts to cultural resources, would apply.

Alternative D does not manage either Cedar Ridge or Castle Gardens as ACECs, and therefore would result in fewer beneficial impacts to cultural resources than Alternative B. However, Alternative D would result in more beneficial impacts to these two significant cultural sites than Alternative A, and substantially more than Alternative C. Neither Warm Springs Canyon Flume nor any known other spiritual/sacred/traditional sites would be protected in this manner, because none of them are in existing or proposed ACECs, Congressional Designated Trails, or WSAs.

Alternative D management of Congressionally Designated Trails would be less beneficial to cultural resources than Alternative B, but would result in substantially more beneficial impacts to non-trail resources than Alternative A or C. Alternative C would result in substantially more adverse impacts to cultural resources because of its management of the CDNST, which requires that the trail be moved if there is a conflict with another use. This management would have the effect of increasing disturbance, which would adversely impact cultural resources.

Although Alternative D does not manage either the expanded Beaver Rim or the Green Mountain areas as ACECs, the special management applied to both those areas will limit adverse impacts from oil and gas operations.

4.5.2. Paleontological Resources

Paleontological resources are defined as any fossilized remains, traces, or imprints of organisms, preserved in or on the Earth's crust, that are of paleontological interest and that provide information about the history of life on Earth. If these resources are found to be scientifically significant, federal regulations require that impacts to them be assessed and impact mitigation measures be instituted to help protect them.

Adverse impacts to significant paleontological resources typically result in a loss of information and/or a loss of integrity of the resource. Adverse impacts to significant paleontological resources on BLM-administered lands include actions that physically damage or destroy all or parts of a resource and lack of protective action, which can result in resource deterioration. Adverse impacts to paleontological resources also result from increases in access to areas containing paleontological resources, which can lead to increases in use, erosion, looting, and vandalism.

Paleontological resources are important for their scientific-data potential. Adverse impacts to these resources are considered long-term, because once the resources are damaged or disturbed, impacts cannot be reversed.

Beneficial impacts to paleontological resources result from special management measures that can enhance the quality of a resource. Stabilization and recovery of paleontological resources and information are examples of long-term beneficial impacts. Erosion control at paleontological localities is another example of beneficial impacts. The beneficial impacts of erosion-control measures would be long-term, but eventually, adverse natural and/or human influences would require more measures to keep paleontological resources from degrading.

4.5.2.1. Summary of Impacts

Impacts to paleontological resources vary by alternative. Alternatives A, B, and C are similar in their protections; Alternative B provides the most protection, followed by Alternative D, and then alternatives A and C. As for specific resources, Alternative B provides for management to protect the Beaver Rim, Bison Basin, Bonneville to Lost Cabin, Lander Slope, and Gas Hills paleontological areas; alternatives A and C manage those resources on a project-specific basis.

Actions required by the Paleontological Resources Protection Act (PRPA) form the foundation for all project-specific decisions regarding paleontological resources. Conflicts between paleontological resources and other resource uses not covered by this RMP will generally be resolved by provisions in the PRPA.

4.5.2.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Paleontological resources are most typically associated with bedrock exposures. Areas of deep soils, alluvium, or colluvium only rarely contain significant fossils. Therefore, the main areas of concern for impacts to paleontological resources are where fossil-bearing bedrock is at or near the surface, such as badlands, hill slopes, or areas with thin soils over bedrock.
- Vertebrate fossils continue to be found throughout the Jurassic, Cretaceous, and Tertiary units exposed in the planning area. The Wind River and Bridger Formations are the most important geologic formations for significant paleontological resources, but several sedimentary formations are known to contain important fossils.
- Surface-disturbing and surface-disruptive activities can dislocate or damage previously undiscovered significant paleontological resources (i.e., unanticipated discoveries) but may also result in their discovery. Destruction of these resources results in a loss of scientific information and precludes interpretation of the resource values to the public.
- Surveys required before surface disturbance in areas known or suspected to contain significant paleontological resources can result in the identification and evaluation of previously undiscovered resources. In addition, continuing scientific research in the planning area will identify new paleontological resources. The BLM will then manage these newly discovered resources accordingly.
- The number of paleontological resources affected by various actions correlates directly to the degree, nature, and quantity of surface-disturbing activities in the planning area.

4.5.2.3. Detailed Analysis of Alternatives

4.5.2.3.1. Impacts Common to All Alternatives

Surface disturbance, neglect, erosion, natural deterioration, and looting and vandalism frequently impact paleontological resources in the planning area. The most common cause of impacts is surface disturbance, especially in areas of industrial development.

Standard procedures have been developed to help address impacts to significant paleontological resources. Standard BLM paleontological resource management and protection procedures, guided by paleontological resource laws such as the PRPA, include archival research, on-the-ground inventories, locality recordation and evaluation, data recovery excavations, condition assessments, stabilization, and, in certain cases, avoidance. These standard procedures can protect paleontological resources from damage. All of the alternatives are guided by these standard procedures.

However, implementing standard procedures does not ensure the identification of all paleontological resources before they are affected. This happens when paleontological resources are buried and are not visible from the surface. These resources are often only discovered after surface-disturbing activities have uncovered them, and construction activities can quickly and severely damage them and result in the loss of much data. This happens regularly in the planning area because paleontological resources are often buried by sediments and soils. In such cases, mitigation of impacts to significant paleontological resources usually entails data recovery and salvage excavations. These excavations are designed to retrieve the remaining data from the locality and study the data to determine what kinds of organisms lived there in the past.

The standard procedures also do not apply to small locatable mineral exploration projects. Locatable minerals exploration projects of fewer than five acres are subject to the 43 CFR 3809 “Notice of Intent” regulations, which offer minimal protections to paleontological resources. These operations do not require BLM approval, and fossil localities may be adversely impacted if mining operations proceed.

Another impact to paleontological resources common to all alternatives results from increased public use of lands, which can result for several reasons, including improved access to formerly remote areas, which is common in areas where development allows for the creation of new roads; the increased popularity and availability of OHVs, which also allows access to formerly remote areas; and increased public interest in paleontological sites or areas. As public use of lands increases, so does the impact to paleontological resources. As there is more use, more paleontological resources are visited or driven over, and some of these resources are looted or vandalized. These impacts would occur under any of the alternatives because access, OHV use, and public use and interest are all expected to increase.

4.5.2.3.2. Alternative A

4.5.2.3.2.1. Program Management

When development projects are proposed that could affect paleontological resources, reactive cultural resource management uses the standard procedures (as devised under the PRPA) to protect important paleontological resources. Proactive management protects important resources that are not threatened by development but still require measures to maintain or enhance their significant qualities. Alternative A uses reactive management to address impacts on a case-by-case basis, and uses proactive management to address impacts to localities such as Beaver Rim, Lander Slope, and Gas Hills. Proactive management is necessary to protect or stabilize these localities and maintain their important qualities, which are threatened by natural or human-caused actions. No special management is applied to the Beaver Rim area outside of the ACEC.

4.5.2.3.2.2. Resources

Under Alternative A, building fire lines with heavy equipment could impact paleontological resources. Current management for wildfires is not well positioned to protect these resources, because information on the locations of paleontological resources likely to be damaged or destroyed is not readily available to fire personnel. Resource advisors are consulted on some fires, but they cannot be everywhere on fires as they happen. Significant paleontological locality information is currently kept confidential, so these resources could inadvertently be impacted.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection for paleontological resources.

4.5.2.3.2.3. Resource Uses

Alternative A provides mostly minimal protection from locatable mineral exploration, except where there are withdrawals or ACECs. Locatable mineral regulations do not follow the standard paleontological resource protection measures described above and, unless the exploration project covers more than 5 acres or is in an ACEC, paleontological resources are subject to little protection from the impacts of mining. Alternative A pursues withdrawals on 23,114 acres and retains all existing ACECs, which would protect some paleontological resources. The Bison Basin, Bonneville to Lost Cabin, and Gas Hills paleontological areas are minimally protected under Alternative A and would be subject to impacts from mineral exploration, while the Beaver Rim and Lander Slope paleontological areas are in ACECs and would be better protected from impacts of locatable minerals exploration.

Impacts to paleontological resources from leasable fluid minerals, leasable solid minerals, mineral materials disposals, and ROWs are better controlled under Alternative A than impacts from locatable minerals exploration. Standard procedures under these programs (described above under *Impacts Common to All Alternatives*) provide for the study, retrieval, and, in some cases, avoidance of paleontological resources. Field inventories, construction monitoring, evaluation of resources, and impacts mitigation are routinely performed for these types of projects, and most paleontological resource sites are adequately studied, collected, and/or protected.

Paleontological resources in the Beaver Rim area could be adversely impacted by oil and gas development because of limited protections.

4.5.2.3.2.4. Special Designations

Most ACECs, Congressionally Designated Trails, and WSAs in Alternative A limit surface disturbances in various ways. These limits include NSO for oil and gas development, mining Plans of Operation, and avoidance of major ROWs. These prescriptions indirectly protect paleontological resources. The Beaver Rim and Lander Slope paleontological areas are in ACECs and would therefore be protected, while the Bison Basin, Bonneville to Lost Cabin, and Gas Hills paleontological areas would not. The Beaver Rim and Green Mountain areas outside of the ACECs could be adversely impacted through unrestricted development.

4.5.2.3.3. Alternative B

4.5.2.3.3.1. Program Management

Alternative B includes more proactive management than Alternative A, which would benefit important fossil localities in the planning area. Alternative B also includes more attention to important paleontological areas like Beaver Rim, Bison Basin, Bonneville to Lost Cabin, Lander Slope, and Gas Hills.

4.5.2.3.3.2. Resources

Fire management under Alternative B protects paleontological resources more than Alternative A. Under Alternative B, management plans will be written for areas with high for potential paleontological areas. These plans will be coordinated with fire personnel and will be used to protect fossil localities when fire suppression activities are needed in these areas.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are greatest under Alternative B, which would provide additional protection for paleontological resources and reduce adverse impacts.

4.5.2.3.3.3. Resource Uses

Alternative B proposes to withdraw 1,609,491 more acres of mineral estate from locatable mineral entry than Alternative A. This would protect more paleontological resources from potential disturbances. Lands withdrawn from locatable minerals entry around the Lander Slope, Beaver Rim, and Bison Basin areas would provide more protection for these areas than under Alternative A. However, Alternative B does not propose to withdraw the Bonneville to Lost Cabin and Gas Hills areas, and those areas would receive fewer protections.

Alternative B closes 1,851,349 more surface acres to leasable fluid minerals exploration than Alternative A, and this would protect more paleontological resources from potential disturbances. Lands closed to leasable fluid minerals exploration around the Lander Slope, Beaver Rim, and Bison Basin areas would provide more protection for these areas than Alternative A. However, Alternative B does not close the Bonneville to Lost Cabin and Gas Hills areas, and those areas receive fewer protections.

Both the Beaver Rim and Green Mountain areas are closed to oil and gas leasing and would therefore have far more beneficial impacts to the paleontological resources located in those areas in comparison to Alternative A.

Leasable solid minerals and mineral materials disposal are more restricted under Alternative B than under Alternative A. Approximately 2 million acres are closed to each of these uses under Alternative B, while Alternative A closes approximately 229,014 acres to mineral materials disposal and 154,106 acres to phosphate leasing. Most identified paleontological areas are closed to mineral materials disposal and phosphate leasing under Alternative B, so those areas would not be subject to impacts.

Alternative B restricts wind-energy development and major ROWs much more than Alternative A. Alternative B protects most paleontological resources in the planning from adverse impacts of wind-energy development and major ROWs, including most of the Lander Slope, Beaver Rim, Bison Basin, Bonneville to Lost Cabin, and Gas Hills paleontological areas.

4.5.2.3.3.4. Special Designations

ACECs, Congressionally Designated Trails, and WSAs in the planning area limit surface disturbances in various ways, including NSO restrictions for oil and gas development, mining Plans of Operation, and avoidance of major ROWs. These prescriptions indirectly protect paleontological resources. Alternative B expands five existing ACECs and designates six additional ACECs. This would enhance the protection of paleontological resources in several parts of the planning area. However, the Bison Basin, Bonneville to Lost Cabin, and Gas Hills paleontological areas would not be protected by any of these special designations, because none of them are in existing or proposed ACECs, Congressional Designated Trails, or WSAs under this alternative.

The expansion of the Beaver Rim and Green Mountain ACECs would beneficially impact paleontological resources by prohibiting oil and gas development. However, the knowledge of the resources that is gained through surface disturbance would not occur as it would under Alternative A.

4.5.2.3.4. Alternative C

4.5.2.3.4.1. Program Management

Alternative C includes somewhat less proactive management than Alternative A. Alternative C would give less attention to the Beaver Rim and Bison Basin paleontological areas, so deterioration would be expected to continue in those areas.

4.5.2.3.4.2. Resources

Fire management under Alternative C would be the same as under Alternative A, and would result in the same impacts to paleontological resources.

Because Alternative C places a greater emphasis on resource use, there are fewer restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations). Therefore, there would be more adverse impacts to paleontological resources than under alternatives A and B.

4.5.2.3.4.3. Resource Uses

Alternative C provides minimal protection for paleontological resources from adverse impacts of locatable mineral exploration. This alternative proposes to withdraw 23,114 fewer acres of federal mineral estate from locatable mineral entry than Alternative A, which would protect fewer fossil resources from potential disturbances. Locatable mining regulations do not follow the standard paleontological resource protection measures described above, and, unless the exploration project covers more than 5 acres, paleontological resources are subject to little protection from the adverse impacts of mining. Also, because this alternative does not include ACECs, lands in ACECs under other alternatives would not be subject the protections of Plans of Operation. None of the identified paleontological resource areas are more than minimally protected from the impacts of locatable mineral exploration under this alternative.

Alternative C authorizes leasable fluid minerals exploration on 13,207 more acres than Alternative A; this would protect fewer paleontological resources from potential disturbances. All identified paleontological resource localities are open with moderate constraints and would be subject to adverse impacts. Alternative C does not apply an MLP in the Beaver Rim area and would therefore not result in the beneficial impacts to paleontological resources that occur under Alternative D from management of the Beaver Rim MLP.

Leasable solid minerals and mineral materials are less restricted under Alternative C than under Alternative A. For phosphates, Alternative C closes 32,255 fewer acres than Alternative A.

For mineral materials, Alternative C closes 87,605 fewer acres than Alternative A. Identified paleontological localities are not protected under this alternative and would be subject to adverse impacts from these resource uses.

Alternative C includes fewer restrictions on wind-energy developments, mines, and major ROWs than Alternative A. This alternative protects only a few fossil resources in the planning area from impacts caused by these kinds of developments. Known identified paleontological areas are not protected and would be subject to adverse impacts from these activities.

4.5.2.3.4.4. Special Designations

Alternative C does not include ACECs and does not recommend any NWSRS-eligible waterway segments as suitable for inclusion in the NWSRS. This opens these areas to development, which would subject paleontological resources to adverse impacts. Under Alternative C, Congressionally Designated Trails are generally protected to ¼ mile on each side, except for locatable minerals entry. For locatable minerals entry, this alternative removes withdrawals and opens the lands along NHTs to unrestricted mining. None of the identified paleontological areas would be protected, including in the Beaver Rim and Green Mountain areas. However, Alternative C manages WSAs the same as Alternative A, which would limit surface disturbances in these areas, and would indirectly protect paleontological resources through avoidance.

4.5.2.3.5. Alternative D

4.5.2.3.5.1. Program Management

Alternative D includes more proactive management than Alternative A or C, but less than Alternative B. This would further prevent adverse impacts to important fossil localities in the planning area, but the focus under Alternative D would be primarily on significant paleontological resources rather than all resources, as under Alternative B. Alternative D management of important paleontological areas like Beaver Rim, Bison Basin, Bonneville to Lost Cabin, Lander Slope, and Gas Hills would be more protective of resources than Alternative A, but less protective than Alternative B, which closes these areas to leasing. The MLP adopted for the Beaver Rim area would prioritize inventories in the area.

4.5.2.3.5.2. Resources

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are greatest under Alternative B, which would provide additional protections for paleontological resources and reduce adverse impacts. Alternative D management of soil, water, and riparian-wetland areas would result in beneficial impacts to paleontological resources similar to those under Alternative A, and slightly more beneficial than those under Alternative C. Alternative D impacts would be substantially more adverse than impacts under Alternative B, which closes 125,403 more riparian-wetland acres to surface disturbance. Under Alternative D, fire management plans will be written for areas with high potential for paleontological resources. These plans will be coordinated with fire personnel and used to protect significant fossil localities when fire suppression activities are needed in these areas. Impacts to paleontological resources under Alternative D would be similar to but less beneficial than under Alternative B.

Limitations on disturbance to protect wildlife, which also protect paleontological resources, are less in Alternative D than B, but greater than Alternative A and substantially more than Alternative C. Greater sage-grouse management limiting surface disturbance has particularly beneficial impacts to paleontological resources, and Alternative D is second only to Alternative B in these protections.

4.5.2.3.5.3. Resource Uses

Alternative D proposes to withdraw 19,741 more acres of mineral estate from locatable mineral entry than Alternative A, 2 percent more of the planning area than Alternative C, and 52 percent fewer acres in the planning area than Alternative B. Withdrawal protects an area from locatable mineral entry and mineral materials disposal, so the more acres withdrawn, the more beneficial impacts to paleontological resources because they are protected from potential disturbances. However, Alternative D would result in many fewer beneficial impacts to paleontological resources than Alternative B because it does not propose to withdraw lands from locatable minerals around the Lander Slope, Beaver Rim, and Bison Basin areas. However, protection for Lander Slope under Alternative D is more protective than under Alternative A. No alternative proposes to withdraw the important paleontological areas of Bonneville to Lost Cabin and Gas Hills, so these areas would receive fewer protections.

Alternative D closes or manages with major constraints 694,348 more acres to mineral leasing than Alternative A and 1,125,193 fewer acres than Alternative B. Accordingly, Alternative D would result in substantially fewer beneficial impacts to paleontological resources than Alternative B, but many more than Alternative C and somewhat more than Alternative A. The closing of Dubois to leasing under Alternative D would beneficially impact paleontological resources similar to Alternative B, would be more beneficial than Alternative A, and substantially more beneficial than Alternative C. The Beaver Rim MLP prioritizes information gathering of the paleontologic resources which would result in beneficial impacts in comparison to alternatives A and C.

Alternative D management of leasable solid minerals and mineral materials disposals would result in more beneficial impacts to paleontological resources than Alternative A or C because Alternative D closes more areas to these discretionary actions. However, Alternative D would result in many fewer beneficial impacts than Alternative B, because Alternative D closes many fewer acres (almost 50 percent less of the planning area) and because Alternative D greater sage-grouse Core Area protections do not limit acres of disturbance or the frequency of disturbance to solid mineral leasing. Although not explicitly closed to mineral materials disposal under Alternative D, it is likely, but not mandatory, that the Core Area would be managed as closed. Alternative D does not close areas with high potential for paleontological resources, such as Bison Basin, that are closed under Alternative B. Alternative D would result in more beneficial impacts than Alternative A or C, because Alternative D closes 34 percent more acres in the planning area to solid mineral leasing than Alternative A, and 36 percent more than Alternative C. In addition, Alternative D closes 33 percent more acres in the planning area to mineral materials disposal than Alternative A, and 38 percent more than Alternative C.

Alternative D restricts wind-energy development and major ROWs to a much greater degree than Alternative A or C, but less than Alternative B, particularly along Congressionally Designated Trails (see below). Like Alternative B, Alternative D protects many paleontological resources in the planning area from the impacts of wind-energy development and major ROWs, including most of the Lander Slope and Beaver Rim. Alternative D does not protect other areas, such as the Bonneville to Lost Cabin and Gas Hills important paleontological areas, from wind-energy development. However, these areas have low potential for wind-energy development, so the difference in impacts between alternatives D and B might not be substantial.

4.5.2.3.5.4. Special Designations

ACECs, Congressionally Designated Trails, and WSAs limit surface disturbances in various ways, including NSO restrictions for oil and gas development, viewshed protections, and avoidance of major ROWs. These prescriptions indirectly protect paleontological resources. Alternative D manages 52 percent less of the planning area as ACECs than Alternative B, but 5 percent more of the planning than Alternative A. Alternative D ACEC prescriptions would be more protective of paleontological resources than Alternative A. Like alternatives A and B, Alternative D maintains the original Beaver Rim area as an ACEC, which would beneficially affect the area's important paleontological resources. Although the expansions of the Beaver Rim and Green Mountain ACECs are not designated, the application of the MLP in the Beaver Rim area and the application of an NSO stipulation in the Green Mountain area will beneficially impact the resources in those area.

Alternative D would result in substantially more beneficial impacts to paleontological resources than Alternative C, which manages ACEC areas identified in other alternatives with standard stipulations. Standard stipulations provide no protection to paleontological resources other than PRPA protections. Alternative D ACEC designations protect 80,832 acres of significant paleontological areas. However, the Bison Basin, Bonneville to Lost Cabin, and Gas Hills paleontological areas would not receive protections in this manner because none of them are in existing or proposed ACEC, Congressionally Designated Trails, or WSAs.

Although the expanded Beaver Rim and Green Mountain areas are not managed as ACECs

Alternative D management of Congressionally Designated Trails would result in fewer beneficial impacts to paleontological resources than Alternative B, but substantially more than Alternative A or C, because alternatives B and D close many more areas to surface disturbance for the protection of trails settings. Management of the CDNST under Alternative A, B, or D would result in more beneficial impacts to paleontological resources management under Alternative C, which requires moving the trail if there are conflicts with other resource uses. Moving the trail would increase surface disturbance and the potential to adversely impact paleontological resources.

4.5.3. Visual Resources

4.5.3.1. Summary of Impacts

VRM Classes establish a measurable standard for the amount of change allowed to visual resources in a specific area. Visual Resource Inventory (VRI) Classes establish the general value of the landscape in terms of its scenic resources. VRM Classes range from I-IV with Class I allowing the least amount of change and IV allowing the most amount of change to the characteristic landscape. VRI Classes also range from I-IV with I being the highest value scenic resource and IV being the lowest value scenic resource. Comparing and contrasting VRM Classes to Lander Field Office VRI Classes provides an indicator of the level of impact to visual resources across the planning area.

Table 4.21, “Visual Resources Inventory and Management Classes by Alternative” (p. 950) provides a comparative analysis between the acres of VRI Class versus the acres of VRM Classes. To facilitate impact analysis, VRM Classes represent the allowable levels of impacts (see Chapter 3) and the VRI Classes represent the general value of the landscape, or a baseline. VRI Classes I or II that are designated as VRM III or IV constitutes an adverse impact to visual resources. This is due to the fact that such a designation exposes these high value scenic resources to a management scenario that allows for moderate to high levels of contrast within the existing environment. Whereas VRI Classes III or IV that are designated as I or II marks a beneficial impact to visual resources. This is due to the fact that such a designation exposes these lower value scenic resources to a management scenario that limits the amount of contrast with the existing landscape. As such, Alterative B would result in the greatest beneficial impact to visual resources, with Alternative D also benefiting scenic values. Alternative C would have the highest level of adverse impact on visual resources with nearly 97 percent of VRI Class I and II areas being managed as VRM Class III or IV. Alternative A has nearly 75 percent of VRI Class I and II areas being managed as VRM Class III or IV.

Table 4.21. Visual Resources Inventory and Management Classes by Alternative

		Inventory Class (IC) Acres							
		I		II		III		IV	
		54,682		570,502		849,370		917,485	
Management Class (MC) Designation		Relation of Management Class (MC) To Inventory Class (IC)							
MC	Acres	Intersect Acres	Percent (MC/IC)	Intersect Acres	Percent (MC/IC)	Intersect Acres	Percent (MC/IC)	Intersect Acres	Percent (MC/IC)
Alternative A									
I	57,443	54,391	99.47%	2,887	0.51%	83	0.01%	15	0.00%
II	202,785	160	0.29%	117,152	20.53%	66,583	7.84%	18,389	2.00%
III	221,121	90	0.16%	80,178	14.05%	87,574	10.31%	54,054	5.89%
IV	1,853,862	42	0.08%	355,248	62.27%	687,850	80.98%	809,348	88.21%
V[1]	57,995	0	0.00%	15,037	2.64%	7,279	0.86%	35,679	3.89%
Alternative B									
I	59,318	54,682	100.00%	4,636	0.81%	0	0.00%	0	0.00%
II	1,284,122	0	0.00%	565,866	99.19%	565,871	66.62%	152,281	16.60%
III	292,890	0	0.00%	0	0.00%	284,500	33.50%	8,390	0.91%
IV	756,813	0	0.00%	0	0.00%	0	0.00%	756,813	82.49%
Alternative C									
I	55,360	54,274	99.25%	921	0.16%	83	0.01%	15	0.00%
II	25,730	138	0.25%	14,815	2.60%	10,781	1.27%	0	0.00%
III	722,356	189	0.35%	342,633	60.06%	324,409	38.19%	54,301	5.92%
IV	1,590,758	82	0.15%	212,126	37.18%	514,094	60.53%	863,169	94.08%
Alternative D									
I	59,792	54,391	99.47%	5,227	0.92%	83	0.01%	15	0.00%
II	744,619	203	0.37%	463,197	81.19%	263,418	31.01%	17,018	1.85%
III	894,495	88	0.16%	102,076	17.89%	516,268	60.78%	275,480	30.03%
IV	694,759	0	0.00%	0	0.00%	69,599	8.19%	624,971	68.12%

[1] VRM Class V no longer exists as a class objective option for managing visual resources. As a result, these areas are managed as Class IV visual resources under Alternative A.

Source: BLM 2009a

The planning area has several unique scenic features that could experience adverse impacts from activities authorized under this RMP. Table 4.22, “VRM Class Designation of Sensitive and Unique Scenic Features in the Lander Planning Area By Alternative” (p. 951) identifies those features and the supporting VRM Class designation under each alternative. An alternative that designates a sensitive and unique scenic feature above Class II represents an adverse impact to this feature, whereas designating the area as a Class II or higher represents a beneficial impact. Overall, Alternative B manages the majority of scenic features as VRM Class II, with Alternative D managing slightly less scenic features as VRM Class II than Alternative B. Alternative C would result in the most adverse impacts to scenic features by managing most of these areas as VRM Class III or IV.

Table 4.22. VRM Class Designation of Sensitive and Unique Scenic Features in the Lander Planning Area By Alternative

Sensitive and Unique Scenic Feature	Inventory Class	VRM Class designation by Alternative			
		Alternative A	Alternative B	Alternative C	Alternative D
Beaver Rim	II, III	II, III, IV	II	III, IV	II, III
Rattlesnake Hills	IV[1]	II, III, IV	II, IV	IV	IV
Cedar Ridge/Johnny Behind the Rocks	II	III	II	IV	II
Green Mountain	II, III	II-IV	II	III, IV	II, III
Red Butte	II	II, III	II	III	II
Red Canyon	II	I, II	I, II	IV	I, II
South Pass Historic Mining District	II, III	I-IV	II	III, IV	II
Copper Mountain, Lysite Mountain	I, III	II-IV	I, III	IV	II-IV
Sweetwater Canyon	I	I	I	I	I
Sweetwater Rocks/Granite Mountains/Sentinel Rocks	I, II	I, II, III	I, II	I, III	I, II, III
Table Mountain-Lander	II	II, III	II	III	II
Twin Creek	II, III	II-IV	II	IV	II
Dubois Area	I-III	II-IV	I-III	III-IV	II
Lander Slope (Eastern Aspect of the Wind River Range)	II, III	I, II, III	II	III	I, II

Source: BLM 2009a

[1] The Rattlesnake Hills was evaluated and found to have Scenic Quality Class B (borderline Class A), seldom seen from important vantage points, and in the Middle ground (5–15 miles) from important vantage points. The inventory IV level may not accurately reflect overall visual quality in the area.

VRM Visual Resource Management

4.5.3.2. Methods and Assumptions

This analysis uses VRM Class designations to project impacts to the visual value of the landscape (as identified in the visual resource inventory). VRI Class designations are the baseline for quantifying changes to the existing visual environment. In addition, the analysis qualifies anticipated impacts under each alternative to the key visual features described above. Lander Slope (including Red Butte and Table Mountain), Red Canyon, South Pass Historic Mining Area, and Sweetwater Rocks/Granite Mountains/Sentinel Rocks are proposed scenic ACECs; the

Areas of Critical Environmental Concern section describes impacts to these key features. The *Recreation* section addresses impacts to Cedar Ridge/Johnny Behind the Rocks, Green Mountain, and Sweetwater Canyon as important recreation features. The *Congressionally Designated Trails – Recreation and Visual Resources* section addresses visual impacts to National Historic and Scenic Trails. This section addresses impacts to the following scenic features: Beaver Rim (entire feature including the existing ACEC), the Twin Creek area, and the Dubois area.

Methods and assumptions used in this impact analysis include the following:

- VRM objectives provide for varying degrees of change (impact) to the visual quality of the landscape. Because VRM planning objectives will be achieved throughout the planning period, it is assumed that impacts to visual quality would reach the allowable change levels described for the various VRM Class objectives.
- VRI Classes I or II that are designated as VRM Class III or IV constitute an adverse impact to visual resources. This is due to the fact that such a designation exposes these high value scenic resources to a management scenario that allows for moderate to high levels of contrast with the existing characteristic landscape. Whereas VRI Classes III or IV that are designated as VRM I or II marks a beneficial impact to visual resources. This is due to the fact that such a designation exposes these lower value scenic resources to a management scenario that limits the amount of contrast with the existing landscape.
- Areas inventoried at high levels of scenic value and managed under lower VRM Class objectives would, in the long term, assume the characteristics of lower VRM Classes because surface disturbance and visual intrusions would be allowed to degrade visual/scenic quality in those areas. Therefore, long-term shifts in scenic quality in the planning area would be confined to the proposed VRM Classes.
- Surface disturbances will adversely impact visual resources. Surface disturbances will introduce new visual elements onto the landscape or intensify existing visual elements, altering the line, form, color, and/or texture that characterize the existing landscape.
- VRM objectives (in Classes I and II) will be reached more effectively and efficiently through complementary allowable use decisions (e.g., NSOs) that include exception criteria that match the allowable change levels described for VRM Class objectives.
- Higher visual protections will be afforded to scenic ACECs; therefore designating scenic ACECs will benefit the visual resource.

4.5.3.3. Detailed Analysis of Alternatives

4.5.3.3.1. Impacts Common to All Alternatives

Common practice in the VRM planning process allows areas projected for intensive resource uses to be managed as VRM Class IV, despite inventory class information. Reducing acres in the planning area in higher (I or II) inventory classes to accommodate resource uses would adversely impact visual resources.

Closing VRM Classes I and II to surface-disturbing activities (subject to exception criteria that match allowable change levels described in VRM objectives) would preserve and/or protect visual resources to the extent allowable under the VRM Class objectives, with long-term beneficial impacts to scenic quality in these areas.

Managing WSAs as a VRM Class I visual resource would benefit visual resources in these areas.

4.5.3.3.2. Alternative A

4.5.3.3.2.1. Program Management

Alternative A designates nearly 100 percent of VRI Class I areas as Management Class I. Alternative A would result in long-term adverse impacts to visual resources because more acres (79 percent) of VRI Class II is managed at a lower level of scenic quality protection (VRM Class III or IV). Alternative A would subject approximately 75 percent of the planning area to surface-disturbing activities, and in the long term allow moderate to major modifications to areas with high scenic quality. This would occur in major portions of Beaver Rim, Twin Creek, and Dubois.

4.5.3.3.2.2. Resources

Often during the planning process areas with resource concerns are assigned a higher VRM Class than shown in VRI Classes. This allows VRM to complement the objective of protecting resources. Under Alternative A, 10 percent of VRI Class III or IV area is designated at the higher management Classes of I and II. This is probably due in part to VRM Class II designation in the Castle Gardens area. This designation was placed to primarily dovetail VRM with cultural resource management. The VRM Class II designation in the Castle Gardens area has a beneficial impact on visual resources because it allows an area inventoried at a lower level to be afforded the protections of a higher VRM Class.

4.5.3.3.2.3. Resource Uses

Alternative A allows for impacts to visual resources that would substantially decrease scenic quality across the entire planning area. As a result of Alternative A, 77.4 percent of the planning area is managed at the lowest VRM Class (IV). In addition, this alternative provides for VRM Classes that are not designated in consideration of the spatial relationship between management classes. By mapping VRM Classes in this way, Alternative A would allow areas with higher VRM Classes to be in view of areas with lower VRM Classes. This would allow the visual impacts associated with VRM Class IV areas to impact neighboring VRM Class II areas. Therefore, it is assumed that numerous VRM Class I and II areas would be degraded by management activities in neighboring VRM Class IV areas. Under Alternative A, this impact would occur in all key visual features. Across the entire planning area, this alternative would allow surface-disturbing activities to develop major modifications to the existing character of the landscape, create a high level of change to the characteristic landscape, and dominate the view and be the major focus of the viewers attention.

Adverse impacts to visual resources in the Beaver Rim area could occur because no MLP is applied under Alternative A.

4.5.3.3.2.4. Special Designations

The following ACEC designations under Alternative A would protect scenic resources: Red Canyon, Lander Slope, and Dubois Badlands. ACEC designation would benefit and enhance visual resources only within the boundaries of these areas. The visual resources in the Beaver Rim and Green Mountain areas adjacent to the ACECs could be adversely impacted because those areas are managed with standard oil and gas stipulations.

The *Congressionally Designated Trails – Recreation and Visual Resources* section addresses direct impacts to visual resources associated with Congressionally Designated Trails.

4.5.3.3.3. Alternative B

4.5.3.3.3.1. Program Management

Alternative B allows for major modifications to the existing character of the landscape in 31.6 percent of the planning area; this designation only intersects VRI Class IV areas. This would result in a negligible impact to visual resources, because the designation would not change the visual quality of the landscape. Alternative B designates the fewest acres as VRM Class IV.

Program management under this alternative would protect important visual resources as identified in the inventory and function to support landscape-level protection of resources. This alternative proposes a slight increase in the acreage managed as VRM Class I compared to VRI Class I areas. This alternative designates 100 percent of the VRI Class II as VRM Class I or II; therefore, this alternative has the least adverse impact to visual resources. In addition, Alternative B designates 82 percent of VRI Classes III and IV as VRM Class II. These VRM Classes afford a high level of scenic quality protection on more than half of the planning area. Alternative B would retain most of the visual landscape in the planning area. All key visual features would be managed as VRM Class I or II. This alternative would protect more high value visual landscapes than Alternative A, and would provide improved protection of key visual features in the planning area.

4.5.3.3.3.2. Resources

Resource impacts are similar to those detailed under Alternative A except that Alternative B's limitations on surface disturbance for the benefit of greater sage-grouse would limit adverse impacts to visual resources in a much larger area.

4.5.3.3.3.3. Resource Uses

Common practice in the VRM planning process allows areas projected for intensive resource uses to be managed as VRM Class IV, despite inventory class information. Reducing acres in the planning area in higher (I or II) VRI Classes to accommodate resource uses would adversely impact visual resources. However, this practice does allow for VRM planning decisions to complement resource use needs, thus avoiding future conflicts between resource use decisions and VRM.

Alternative B would result in 31.6 percent of the planning area being managed as VRM Class IV. This designation only encompasses areas inventoried as Class IV. The Class IV area occurs primarily in a blocked area and is flanked by VRM Class III or higher, which provides VRM Classes that consider the spatial relationship between management classes. Alternative B would result in fewer adverse impacts to visual resources from resource uses than Alternative A.

4.5.3.3.3.4. Special Designations

The following ACEC designations under Alternative B would benefit and enhance visual resources in these areas: Lander Slope (including Red Butte and Table Mountain), Red Canyon, South Pass Historic Mining Area, and Sweetwater Rocks/Granite Mountains/Sentinel Rocks. This is more beneficial than Alternative A.

The *Congressionally Designated Trails – Recreation and Visual Resources* section addresses direct impacts to visual resources associated with Congressionally Designated Trails. In addition, Alternative B prescribes the background zone (5 to 15 miles) of NHTs as VRM Class II. This results in an increase of Class II visual resources from inventory levels, which would beneficially impact visual resources associated with trails and non-trails areas.

4.5.3.3.4. Alternative C

4.5.3.3.4.1. Program Management

Alternative C proposes no increase in the area managed as VRM Class I compared to VRI Class I areas. This alternative designates 97 percent of VRI Class II and III areas as VRM Class III or IV. This would allow for major modifications to the existing character of the landscape in more than 66 percent of the planning area. Under this alternative, VRM Class III and IV areas include all key visual resource features. The 1.1 percent of the planning area managed as Class II under Alternative C encompasses only ¼ mile on either side of Congressionally Designated Trails. This alternative would result in more adverse impacts to visual resources than Alternative A.

4.5.3.3.4.2. Resources

Under Alternative C, the 3.4 percent of the planning area designated as VRM Classes I and II is based primarily around WSAs and Congressionally Designated Trails. This alternative designates less area than Alternative A to VRM Classes I and II.

4.5.3.3.4.3. Resource Uses

Alternative C would result in more long-term adverse impacts to visual resources than Alternative A because more acres of VRI Class II would be managed at a lower level of scenic quality protection (VRM Class IV). Alternative C would subject 66 percent of the planning area to surface-disturbing activities, and in the long term allow high value scenic areas to assume impacts characteristic of VRM Class IV. This would occur in major portions of Beaver Rim, Twin Creek, and Dubois areas.

Adverse impacts to visual resources from standard management in the Beaver Rim and Green Mountain areas could occur from oil and gas operations.

4.5.3.3.4.4. Special Designations

Alternative C does not designate any ACECs. This would adversely impact visual resources in areas designated as ACECs under other alternatives. The *Areas of Critical Environmental Concern* section addresses these impacts.

The *Congressionally Designated Trails – Recreation and Visual Resources* section addresses direct impacts to visual resources associated with Congressionally Designated Trails. The areas designated as expanded ACECs under Alternative B would likely be adversely impacted in the same manner as under Alternative A.

4.5.3.3.5. Alternative D

4.5.3.3.5.1. Program Management

Alternative D allows for major modifications to the existing character of the landscape on 29 percent of the planning area; this designation only intersects VRI Class IV areas. This would result in a minor impact to visual resources because the designation would not change the visual quality of the landscape. This alternative designates fewer acres to VRM Class IV than Alternative A, but more than Alternative B.

Program management under this alternative would protect important visual resources as identified in the inventory and function to support landscape-level protection for resources. This alternative proposes a slight increase in the area managed as VRM Class I compared to VRI Class I areas. This alternative designates 82 percent of VRI Class II as VRM Class I or II. Approximately 32 percent of VRI Class III and IV is designated as VRM Class I or II. The VRM Class II designation would beneficially impact visual resources because it would allow areas inventoried at a lower quality to be afforded the protections of a higher VRM Class. The increase in VRM Classes I and II would result in more than one third of the planning area being managed at VRM Classes I and II. Alternative D would retain most of the visual landscape in the planning area. All key visual features would be managed as VRM Class I or II. Therefore, this alternative would protect more visual landscapes than Alternative A, and would provide improved protection of key visual features in the planning area.

4.5.3.3.5.2. Resources

The impacts to visual resources from resource management would be the same as Alternative A.

4.5.3.3.5.3. Resource Uses

Common practice in the VRM planning process allows areas projected for intensive resource uses to be managed as VRM Class IV, despite inventory class information. Reducing acres in the planning area in higher (I or II) VRI Classes to accommodate resource uses would adversely impact visual resources. However, this practice does allow for VRM planning decisions to complement resource use needs, thus avoiding future conflicts between resource use decisions and VRM.

This alternative would result in 18 percent of VRI Classes I and II areas being managed as VRM Class IV; therefore, this alternative would result in fewer adverse impacts to visual resources from other resource uses than Alternative A but more than Alternative B. Alternative D applies an MLP to the Beaver Rim area which would beneficially impact the visual resources in the area by applying an NSO stipulation to the most important visual resources in the area.

4.5.3.3.5.4. Special Designations

The following ACEC designations under Alternative D would benefit and enhance visual resources in those areas: Lander Slope (including Red Butte and Table Mountain), Red Canyon, and South Pass Historic Mining Area.

The *Congressionally Designated Trails – Recreation and Visual Resources* section addresses direct impacts to visual resources associated with Congressionally Designated Trails. This alternative prescribes the background zone (5 to 15 miles) of NHTs as VRM Class II. This results in an increase in the area managed as VRM Class II compared to the VRI Class II area, which would beneficially impact visual resources associated with trails and non-trails areas.

Visual resources in the expanded Green Mountain ACEC would be beneficially impacted by the application of an NSO stipulation for the benefit of the elk calving area since surface disturbance, including building highly visible roads, would be prohibited.

4.6. Land Resources

4.6.1. Lands and Realty

This section describes potential impacts to the lands and realty program from management alternatives. Included in the lands and realty program are land tenure adjustments (e.g., sales, exchanges, acquisitions), land use authorizations (i.e., leases, permits, grants), and withdrawals, classifications, and segregations. Lands and realty actions (land use authorizations) also authorize ROWs and renewable energy; however, the *Rights-of-Way and Corridors* and *Renewable Energy* sections address impacts to these specific resource uses. This section focuses on how management actions could impact the lands and realty program by increasing, limiting, or preventing the potential for realty actions.

The purpose of the lands and realty program is to facilitate management of BLM-administered lands and resources in the planning area. The program adapts according to changing land management, resource needs, demand for public land to meet expanding communities and other public purposes, and other issues. Therefore, lands and realty program actions generally result in beneficial impacts in the planning area in relation to multiple-use objectives.

Adverse impacts to the lands and realty program result from management actions that reduce the available land base or make land tenure adjustments or land use authorizations more difficult. Beneficial impacts to the lands and realty program result from land tenure adjustments that increase land management efficiency or enhance the management of resources through consolidation of public lands into more easily managed blocks. Direct impacts to lands and realty occur when other resources are present, preventing or making it more difficult to complete a transaction. Mitigating resource values required for a land disposal transaction can require further lands and realty actions and increase processing costs and timeframes required to complete the transaction and temporarily delay the transaction. Indirect impacts to the lands and realty program result from management that subsequently affects realty actions, such as the development of parcels transferred out of BLM ownership, which can increase, limit, or prevent the potential for future realty actions. Most impacts to the lands and realty program would be long-term and result from management that allocates land for land tenure adjustments or land use authorizations over the course of the planning period.

Impacts that affect the lands and realty program result from management that increases, limits, or prevents the potential for realty actions. The primary impacts under the alternatives would be associated with lands identified for potential disposal, acquisition, and withdrawal, and management that makes realty actions more difficult to complete. In the past, there has been very little change in land tenure through either disposal or acquisition, and this trend is expected to continue. Alternative A identifies lands for disposal that, upon review, do not meet the current requirements for disposal because some might have important resources, such as riparian-wetland areas or wildlife values. Otherwise, there is very little difference among the alteratives regarding lands identified for disposal.

4.6.1.1. Summary of Impacts

By Lander Field Office policy for privacy reasons, no private lands are identified for acquisition under any alternative, although lands that have been proposed for exchange have been identified for disposal. NEPA analysis will be completed, allowing for public input, during the process. The Lander Field Office has identified certain state lands for exchange to support resource program objectives. These lands are typically surrounded by BLM-administered public lands and are managed in the same manner as the public lands.

No lands are identified for community expansion under any alternative. Certain areas are identified for potential R&PP leases, although there are no current proposals for such leases. These areas are identified in Chapter 2 in the Recreation section and Map 92.

Due to regulatory provisions, decisions regarding whether areas are available for locatable mineral exploration and development are actions in the lands and realty program. Unlike decisions that open or close an area to oil and gas leasing which are managed in the oil and gas program or whether an area is open or closed to livestock grazing which is managed as a range decision, prohibiting locatable mineral actions is pursued through the lands and realty program. Accordingly, limits on uranium or bentonite mining are undertaken as a realty action.

The biggest difference among the alternatives is in the segregation of lands to pursue locatable mineral withdrawal. (For the sake of readability, these lands are discussed here and in other sections as “withdrawn,” although the RMP action is to identify lands to segregate for purposes of withdrawal from mineral entry.) See the discussion under *Management Actions Common to All Alternatives* at the beginning of Chapter 2 and the Mineral Report for further explanation of mineral withdrawals.

The procedural action to withdraw or exchange a property is handled through the realty program, but the reasons for the exchange, disposal, or acquisition and the adverse or beneficial impacts are primarily to other programs (e.g., withdrawals adversely impact the locatable mineral program). Specifics of each proposed withdrawal are analyzed in the sections covering the programs that would initiate the action. For example, withdrawal from locatable mineral entry for protection of elk in the East Fork ACEC is analyzed in the *Areas of Critical Environmental Concern* section. Each resource and use further analyzes the adverse and beneficial impacts of withdrawals on other resources and resource uses.

Alternative A continues withdrawals identified in the 1987 RMP and withdrawn, but proposes no new withdrawals. Under Alternative B, 1,632,605 acres (68 percent of the planning area) are withdrawn. Under Alternative C, no new withdrawals are identified and all existing withdrawals except for the Yermo threatened and endangered species withdrawal are allowed to expire. Under Alternative D, 42,855 acres (an increase of 85 percent over Alternative A) are pursued for withdrawal.

Withdrawals may result in long-term adverse impacts to the lands and realty program by limiting or restricting lands and realty actions in these areas. Withdrawals revoked or modified could open these public lands to allocation and management under the mining laws. Opening public lands to management and allocation would result in long-term impacts to the lands and realty program by increasing the available land base for land tenure adjustments and land use authorizations.

Table 4.23, “Acreage of Withdrawals in the Lander Planning Area” (p. 959) summarizes segregations and withdrawals by alternative in the planning area by the resource they protect. In some cases, an area is withdrawn for the protection of more than one resource. Therefore, individual resource withdrawal acres in the table cannot be added to determine total acreage of withdrawal; the final row of the table shows the total acres of withdrawal for each alternative, regardless of resource.

Table 4.23. Acreage of Withdrawals in the Lander Planning Area

	Alternative A	Alternative B	Alternative C	Alternative D
Habitat protection	21,862	1,482,580	0	36,928
Cultural or paleontological value protection	927	563,640	0	2,688
Recreation or visual values and/or visitor protection	355	169,774	0	4,380
Total Withdrawals	23,114	1,632,605	0	42,855
Source: BLM 2009a				

4.6.1.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The demand for land-tenure adjustments will increase, but BLM's ability to respond to or to satisfy increased demands for land sales and exchanges will be limited by budget and personnel constraints into the foreseeable future. However, the number of land use authorizations will increase over the course of the planning period.
- Land-tenure adjustments (e.g., disposal and acquisition) focus on disposing of scattered parcels in the planning area to improve management opportunities and increase resource protection and use.
- Existing withdrawals to other federal agencies (i.e., the U.S. Bureau of Reclamation, the U.S. Department of Energy, and the Federal Energy Regulation Commission) will continue and will not vary by alternative. These lands are not analyzed in this chapter.
- The lands and realty program is a support program rather than an environmental component. The program responds to requests for authorizations, permits, leases, land tenure adjustments, etc., from other programs or outside entities. The discussion of impacts to the lands and realty program under each alternative would be limited to the influences on ROW authorizations for other permitted activities; that is, whether the impacts of other resource actions would influence or modify the location, size, or design of a given proposal or, in some cases, preclude approval of a lands and realty action.
- The priority or the urgency associated with any acquisition is established by the resource program benefiting from the acquisition; funding sources are limited.
- The demand for disposal of public land is very infrequent and primarily to support public purpose (R&PP) lease. Before any disposals, lands would be examined for the presence of high-value resources. Lands with high surface values would not be disposed of, or the disposal would provide for those values to be preserved. Therefore, land disposals would not substantially impact other resource programs.
- The BLM has received expressions of interest by members of the public to exchange privately owned property for public lands. The lands identified for BLM disposal are identified on Map 141. BLM has not analyzed impacts of disposal of these lands because other management

decisions to be made in the plan revision will determine whether disposal would be authorized. For example, one of the parcels identified for disposal is within an ACEC in two alternatives but not in the other two alternatives. Whether or not the ACEC is designated will be a significant factor to determining whether disposal is appropriate. A site-specific analysis during the implementation phase will then be made.

- Existing withdrawals will be retained throughout the planning period. Whether existing withdrawals will be allowed to expire varies among the alternatives.
- Before any disposals, lands will be examined for the presence of high-value resources. Lands containing high-value resources will not be disposed of, or the disposal would allow for those resources to be preserved.
- Before any potential land disposal, mineral development potential will be evaluated according to FLPMA sections 206 and 209.

4.6.2. Renewable Energy

The May 2001 report of National Energy Policy Development Group (National Energy Policy Development Group 2001), defines renewable energy as energy obtained from sources that are essentially inexhaustible (unlike for example, fossil fuel, of which there is a finite supply; see the *Mineral Resources* section). Renewable sources of energy include conventional hydroelectric power, wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.

Renewable energy management actions under the alternatives focus solely on wind energy in the planning area due to the lack of demand in the near future for development of solar and biomass energy. The following assumptions support the approach:

The BLM manages geothermal resources as a leasable mineral; therefore the *Leasable Minerals – Geothermal* section addresses geothermal resources.

If a solar or other type of renewable project is proposed in the future, it would be analyzed under a new NEPA document that would evaluate whether an RMP amendment would be required to approve the action. If the proposal does not meet the objectives of the RMP – for example, a proposed industrial solar project on the south-facing slope of the Dubois Badlands WSA – the project could be analyzed without an RMP revision because it clearly would not meet RMP objectives for WSA management.

Management actions by alternative for renewable energy include the consideration of renewable energy projects throughout the planning area, with consideration of other resource values, and generally to support national energy plans and policies regarding the development of renewable energy projects.

Management actions that limit, prohibit, or otherwise decrease the potential for wind-energy development would result in adverse impacts to renewable energy.

Management actions and resource uses that increase the locations with the potential for renewable energy and do not exclude or avoid wind-energy development would result in beneficial impacts to wind-energy development.

Direct impacts to wind-energy development include management actions that designate wind-energy or renewable-energy avoidance and exclusion areas.

Indirect impacts to wind-energy development include management actions that result in subsequent restrictions, such as management for resource values that require mitigation, relocation, or denial of authorizations for wind-energy development.

4.6.2.1. Summary of Impacts

The following actions would have a long-term impact to wind-energy development: actions that prohibit, or otherwise decrease the potential for wind-energy development; ROW avoidance and exclusion areas; and actions that cannot be mitigated to allow for wind-energy development.

4.6.2.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Future wind-energy development proposals on BLM-administered lands in the planning area are subject to the decisions and policy developed in the BLM *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States* (BLM 2005a) and ROD. The ROD includes policies and BMPs for minimizing the impacts of wind-energy development on BLM-administered lands. The Programmatic ROD is broad in scope and does not address most site-specific issues.
- Wind-energy demand and development is expected to increase during the planning period, directly related to energy prices, national and state policies regarding renewable energy, and other factors that encourage demand for and development of renewable-energy resources.
- Renewable-energy projects depend on the ability to transmit the energy product. Therefore, there is a direct relationship between the ability for energy transmission and renewable-energy project placement.
- Mapping of areas with wind-energy potential is based on a large-scale nationwide mapping process likely to show a large margin of error if used for specific project location and prioritization of available renewable-energy development sites. Wind-energy potential in the planning area is described by wind power classification, as shown in Table 4.24, “Wind Power Classification” (p. 961). This information is derived from U.S. Department of Energy National Renewable Energy Laboratory wind-energy potential data (NREL 2002). Wind-power-class areas comprise large geographic areas, within which there are numerous areas that do not meet the overall resource potential for each wind power class.

Table 4.24. Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 Meters (watts per square meter)	Wind Speed at 50 Meters (meters per second)[1]	Wind Speed (miles per hour)
2	Marginal	200-300	5.6-6.4	12.5-14.3
3	Fair	300-400	6.4-7.0	14.3-15.7
4	Good	400-500	7.0-7.5	15.7-16.8
5	Excellent	500-600	7.5-8.0	16.8-17.9
6	Outstanding	600-800	8.0-8.8	17.9-19.7
7	Superb	>800	>8.8	>19.7

Source: NREL 2002

[1] Wind speeds are based on a Weibull k value of 2.0.

> greater than

- Lands in the planning area have varying wind-energy potentials. Approximately 104,707 acres have been classified for outstanding and superb potential; 1,546,249 acres have been classified for excellent potential, and 743,254 acres have been classified for good, fair, poor, or marginal potential. For purposes of this analysis, it is assumed that only lands with excellent or better wind potential will be economically feasible for industrial-scale wind-energy generation. The potential for wind-energy development in the planning area will directly relate to the proximity of high wind-power classification areas to transmission lines, and the potential to cause impacts to other resources or resource uses (such as visual resources).

- Ice can accumulate on the blades of wind turbines and occasionally be released. Therefore this analysis assumes that the design of the wind-energy development will close to human presence any area necessary to protect human health and safety.
- Wind energy is the most likely type of renewable energy to be developed in the planning area.
- Increased development of wind-generated energy (or other renewable energy) will also increase the demand for wind-energy development authorizations for transmission lines to distribute produced energy to the electrical grid.
- Management objectives for other resources and resource uses could limit the location and development of wind-energy infrastructure in the planning area.
- Wind-energy development proposals will likely be for areas where there are conflicting resource issues.

Biomass Energy

- Beetle-killed trees are potential stock to generate electricity, either by direct burning or by anaerobic digestion (biomass-generated energy). Because there is no infrastructure for converting the dead trees into energy and because of the large inventory of product from other areas that have experienced severe tree loss, it is not likely that commercial or industrial generation of electrical power from biomass will occur in the planning area.
- Any large-scale use of trees from the public lands would require a site-specific analysis and would depend on technologies and infrastructure that cannot be analyzed in this EIS.

Solar Energy

- As indicated by the exclusion of Wyoming from the Programmatic Solar Energy EIS, Wyoming is not likely to be developed for industrial-scale solar-generated electricity projects. Future solar energy development will be site-specific and individual/commercial in scope.
- On a site-specific basis, solar-generated electricity might be the best source to power electrical equipment for activities such as range improvements. This type of action is allowed within the appropriate program, such as the range improvement program or the wildlife program if a fish gate is being operated, and is not treated as a renewable energy project.

4.6.2.3. Detailed Analysis of Alternatives

4.6.2.3.1. Impacts Common to All Alternatives

Areas in the NLCS are exclusion areas for wind-energy development by programmatic decision. These areas include WSAs (55,338 acres), the CDNST, NHTs, and eligible and suitable waterway segments proposed for inclusion in the NWSRS. This will influence the locations of wind-energy development projects allowed in the planning area.

The Wind Energy EIS ROD did not identify any buffer for trails (both scenic and historic) that were closed to wind-energy development. Accordingly, the alternatives identify different buffers based on the objectives associated with each alternative. These vary from ¼ mile on either side to exclusions for wind-energy development of 20 miles on each side of the NHTs.

Management under all alternatives will preclude the development of wind-energy projects within the boundaries of NWSRS-eligible waterway segments.

4.6.2.3.2. Alternative A

4.6.2.3.2.1. Program Management

Alternative A opens 2,113,512 acres for wind-energy development. A total of 215,882 acres are wind-energy exclusion areas and 64,816 acres are wind-energy avoidance areas (Map 97).

4.6.2.3.2.2. Resources

Alternative A soil resource management that avoids disturbing soils with LRP, on slopes, in riparian-wetland areas, or in groundwater recharge areas would restrict the location of or, in some cases, preclude the development of wind energy. Even if these areas were available on a case-by-case basis, it is likely that BMPs or relocation would be required. Approximately 58,179 acres with wind-energy potential are in areas that could be precluded for the protection of soils. Protections for groundwater recharge areas would limit the location or design of some projects, and in situations where these areas would not be avoided, additional BMPs would be applied to prevent contamination of these areas and adversely impact wind-energy development. While adverse impacts to the renewable energy program, they would not be likely to make development infeasible.

Alternative A mitigation measures (i.e., seasonal restrictions to protect wildlife resources and critical habitat) would restrict the timing of surface-disturbing and other disruptive activities, but would not preclude construction at another time of the year. This wildlife management would not adversely impact the renewable energy program.

Alternative A management to protect special status plants by creating keep-out zones (exclusion areas) for wind-energy development would restrict the location and design of wind-energy facilities and in some locations preclude the placement of turbines. However, the only mapped site for threatened and endangered plants is for the desert yellowhead (Yermo), a species which is not in an area considered to have wind-energy potential.

Protection of cultural resources under Alternative A would adversely impact wind-energy development because mitigation measures designed to reduce impacts could require alternate locations. The protection of the setting of sacred/spiritual/TCPs (where the setting contributes to NRHP eligibility) will be achieved through avoidance within ¼ mile of the cultural property. In some cases, wind-energy development would be precluded because it involves high-profile structures with a high level of contrast with setting. Paleontological resource management under Alternative A could restrict the location of wind-energy development to avoid adverse impacts to paleontological values. The location of these resources could limit the placement of facilities or require facilities relocation, but would rarely preclude the action as a whole.

VRM Class I and II restrictions would adversely impact wind-energy development under Alternative A by limiting the amount of contrast that would be allowed. Wind-energy projects and their related transmission lines are linear and often 400 to 500 feet tall. Limitations on contrast related to these most restrictive VRM Classes would adversely impact wind-energy development, although not preclude it depending on a visual contrast simulation. Federal Aviation Administration requirements for air safety mandate that wind turbines be marked to make them highly visible. More contrast is allowed in Class III and IV areas, and these areas would be open to wind-energy development on a case-by-case basis. Acres of VRM Classes under this alternative are as follows: Class I, 57,443; Class II, 202,785; Class III, 222,121; Class IV, 1,853,862; and Class V, 57,995.

4.6.2.3.2.3. Resource Uses

Alternative A management for mineral resources is generally compatible with wind-energy development and might beneficially impact wind-energy development to the extent that ROWs are developed in conjunction with oil and gas or uranium development that would be available for use by wind-energy projects. Travel management that closes areas to motorized vehicle use would adversely impact wind-energy development; however, the areas closed to motorized vehicle travel under Alternative A do not have wind-energy potential. Recreation management precludes or limits ROWs, including wind energy, in developed recreation sites, which would adversely impact wind-energy development.

Alternative A does not designate any ROW corridors, which would adversely impact wind-energy development because the transmission line ROWs would need to be analyzed on a case-by-case basis. However, except for special designations and Beef Gap, Alternative A does not designate ROW exclusion areas, so there would be no other adverse impacts to wind-energy development from ROW management. It is not likely that the Beef Gap ROW exclusion area would impact wind-energy development because required transmission lines would be likely to extend from the area of wind-energy potential in the eastern part of the planning area south to the Gateway transmission line currently being analyzed in an EIS or north to Casper (a route that would not go through Beef Gap).

4.6.2.3.2.4. Special Designations

Alternative A management to protect resource values in special designation areas would adversely impact wind-energy development by managing certain ACECs as avoidance areas for major ROWs, which would include wind-energy development and related transmission lines. There are 169,229 acres of special designations in Alterative A. All wind-energy proposals in ACECs or other special designations are reviewed on a case-by-case basis, with mitigation measures applied through activity-level planning; proposed wind-energy developments could be denied or required to relocate. Because of the contrast of the very large turbines used by current wind-energy technology, it is not likely that wind-energy projects would meet the VRM objectives for ACECs, Congressionally Designated Trails, and WSRs. While any proposal would need to be analyzed on a site-specific basis (Wind Energy EIS ROD does not specifically exclude wind-energy development in ACECs), management of special designations would likely result in a major and long-term adverse impact to wind-energy development in the planning area. Alternative A protection of Congressionally Designated Trails would adversely impact the renewable energy program by limiting or precluding development within ¼ mile of trails and could limit the places where ROWs may cross NHTs. This would be a long-term adverse impact.

4.6.2.3.3. Alternative B

4.6.2.3.3.1. Program Management

Alternative B opens a total of 41,372 acres for wind-energy development, while 2,328,951 acres are exclusion areas and 23,887 acres are avoidance areas (Map 98).

4.6.2.3.3.2. Resources

Alternative B protections for soil and water resources would result in greater adverse impacts to wind-energy development than Alternative A, because Alternative B protects substantially more areas from surface disturbance. This management would require much more relocation of wind-energy projects and would preclude more projects than Alternative A. Limitations to protect lands with wilderness characteristics under this alternative would result in more adverse impacts from wind-energy development than Alternative A, which does not specially manage these areas. Riparian-wetland management under Alternative B would be likely to require relocations or make some projects impossible that would be allowable under Alternative A.

Management protections for wildlife under Alternative B would result in substantially more adverse impacts to wind-energy projects than under Alternative A, because Alternative B applies more timing restrictions and buffers, and avoids or closes more areas to surface disturbance. Some of these protections would not adversely impact ROWs, because the protections limit only the time of construction and not the ROW authorization. However, ROW exclusion or avoidance areas would result in more adverse impacts to wind-energy development unless, on a case-by-case basis, it could be shown that there would be no adverse impacts to wildlife species. Because there has been relatively little research to identify impacts to wildlife from industrial wind-energy generation, the requirement to show that there would be no impacts to wildlife could preclude most wind-energy development.

Adverse impacts to wind-energy development from the protection of special status plants under Alternative B would be relatively minor, the same as under Alternative A. Adverse impacts from management of special status wildlife, however, would be much greater under Alternative B, because the alternative places substantially more limitations on ROWs and surface disturbance. Particularly regarding protections for greater sage-grouse, Alternative B would open many fewer areas to wind-energy development and place more restrictions on the allowable height of poles or structures where adverse impacts to greater sage-grouse would result. This would restrict or preclude many utility ROWs and turbines. Alternative B surface disturbance limitations and closure of the greater sage-grouse Core Area would close 2,328,951 acres to wind-energy development. In addition, nesting habitat outside the Core Area have limits on the number of energy disturbances and the percent of surface disturbance from any source, including on private and state owned lands, which would require a site-specific analysis to determine if disturbance caps have been reached or would be reached by the wind-energy project. While adverse impacts to wind-energy development cannot be quantified, these limits could preclude wind-energy development outside the Core Area, making adverse impacts to wind-energy development under Alternative B the greatest of any alternative.

Alternative B protection of special status species and other wildlife habitat in the Dubois area not already included in an ACEC would result in many more adverse impacts to wind-energy development than protections under Alternative A. Alternative A manages ACECs in the Dubois area avoidance areas for wind-energy development; Alternative B manages the entire Dubois area as an exclusion area for wind-energy development. This difference in impacts between alternatives A and B could mean little considering other limitations in the area, such as wilderness designations in the Shoshone National Forest.

Because Alternative B includes a much larger avoidance area around the setting of sacred/spiritual/TCPs (where the setting contributes to NRHP eligibility) than Alternative A, Alternative B would result in many more adverse impacts to wind-energy development than Alternative A. Under Alternative B, there would be fewer ROWs and related projects completed due to the increase in distance from the cultural property, but it is not likely that these avoidance areas would preclude most developments. Management of paleontological resources under Alternative B would result in more adverse impacts to ROWs than Alternative A by managing non-ACEC National Natural Landmarks as exclusion areas for wind-energy development. The demand for ROWs in these areas could be limited, so the degree of adverse impacts to the renewable energy program cannot be determined. However, in the Beaver Rim area, which has wind-energy potential, there could be major adverse impacts to wind-energy development.

Alternative B VRM would result in substantially more adverse impacts to wind-energy development and associated ROWs because many more areas are designated as VRM Classes I and II under Alternative B than under Alternative A, and fewer are designated VRM Classes III and IV. Alternative B acres of VRM Classes are as follows: Class I, 59,317 (2 percent); Class II, 1,284,122 (54 percent); Class III, 292,890 (12 percent); and Class IV, 756,813 (32 percent). While this management under Alternative B would not preclude wind-energy development and ROWs, it would be unlikely that any projects using the high-profile technology currently in use on an industrial scale would meet VRM Class I or II objectives and might not meet Class III objectives, a substantial impact to wind-energy development.

4.6.2.3.3.3. Resource Uses

Alternative B sharply limits mineral development, which would result in a secondary indirect impact to wind-energy development. Alternative B withdraws 1,609,491 more acres and closes areas that are only avoided under Alternative A. It is not likely that areas closed to mineral development to protect other resources would be made available for wind-energy development, even if wind-energy development is not specifically excluded. Moreover, mineral programs generally require ROWs, including ROWs for power transmission. Alternative B would result in more beneficial impacts to wind-energy development than Alternative A to the extent that Alternative B designates more ROW corridors, which would facilitate transmission lines. However, these beneficial impacts would be outweighed by the adverse impacts from other management under Alternative B, including limiting major ROWs to the designated corridors (an adverse impact) and closing substantially more land to wind-energy development to protect other resources.

Alternative B opens 867 acres with wind potential for industrial wind-energy development and designates major ROW corridors; this would beneficially impact wind-energy projects situated to use these areas and corridors.

Alternative B recreation and travel management would result in more adverse impacts to wind-energy development than Alternative A, Alternative B closes 12 times more acres to motorized vehicle travel than Alternative A; closures to motorized vehicle travel also create exclusion areas for wind-energy development and transmission line ROWs. However, this travel management would not be likely to result in measurable adverse impacts to wind-energy development because, even without motorized vehicle closures, it is not likely that wind-energy development would be authorized because of the values that drive the travel management closures (the areas are ROW exclusionary areas).

4.6.2.3.3.4. Special Designations

Alternative B management to protect ACECs and other special designations would result in substantially more adverse impacts to wind-energy development than Alternative A. Alternative B manages many more areas as exclusion or avoidance areas for wind-energy development and transmission line ROWs, particularly in association with NLCS units. Limitations on locations for crossing Congressionally Designated Trails would be more adverse than Alternative A, which would make north-south transmission lines very difficult. Limits on wind-energy development and its related transmission lines in the buffers around the trails would be much more adverse under Alternative B, although the alternative does allow projects not visible from the trails. With current technology for turbines, it is not likely that wind-energy development would be allowed within trail buffers, and perhaps beyond, depending on a visual contrast rating.

Alternative B extends NWSRS suitability management to more areas than Alternative A, which would adversely impact wind energy, although it is not likely that these waterway segments would have the wind potential suitable for wind-energy development.

4.6.2.3.4. Alternative C

4.6.2.3.4.1. Program Management

Alternative C opens 2,284,235 acres for wind-energy development. A total of 94,157 acres are exclusion areas for wind-energy development and 15,818 acres are avoidance areas for wind-energy development (Map 99).

4.6.2.3.4.2. Resources

Alternative C would result in the fewest adverse impacts to wind-energy development because it restricts surface disturbance less than any other alternative for the protection of soil, water, fish, wildlife, and cultural resources, and substantially less than Alternative B. Alternative C is the same as Alternative A in its lack of special management of lands with wilderness characteristics, so there would be no adverse impacts to the ROW program, of which wind-energy development is a part. This difference could impact wind-energy development if the demand for such development increased in response to management of the Whiskey Mountain area, which has wind-energy potential, under standard stipulations.

Alternative C includes many fewer protections for special status species and therefore would result in many fewer adverse impacts to wind-energy development from this management than any other alternative. However, the BLM must still manage to protect special status species under Alternative C, so these adverse impacts may be only slightly fewer under this alternative. Therefore, even without RMP prescriptions such as limitations on height of structures in the greater sage-grouse Core Area, each project would be considered for adverse impacts in the Core Area and the height of proposed structures would be analyzed. However, management under

Alternative C would be likely to accelerate the downward trend in greater sage-grouse populations and would be the most likely alternative to lead to greater sage-grouse listing under the ESA.

Alternative C management for the protection of cultural and paleontological resources is the same as Alternative A. Therefore, impacts to wind-energy development under Alternative C would be the same as under Alternative A, but less than adverse impacts under Alternative B. Alternative C manages fewer areas as VRM Classes I and II and more areas as VRM Classes III and IV than Alternative A or B. Therefore, Alternative C includes many fewer limitations on the wind-energy program, substantially so compared to Alternative B.

4.6.2.3.4.3. Resource Uses

Alternative C closes the fewest areas to mineral development, which would result in secondary beneficial impacts to wind-energy development because there would be more locations for roads, transmission lines, and pipelines. Alternative C designates the most ROW corridors and places the fewest restrictions on ROW locations, including major ROWs, which would beneficially impact wind-energy development. Therefore, Alternative C would result in the fewest adverse impacts to the ROW program (and therefore wind-energy development) of all the alternatives, and would result in substantially fewer adverse impacts than Alternative B. Alternative C would result in the most beneficial impacts to wind-energy development, which can generally be co-located with other resource uses.

Alternative C closes the fewest areas to motorized vehicle travel and has the fewest roads with travel limited to designated roads and trails. Therefore, Alternative C would result in the fewest adverse impacts to ROWs and the most beneficial impacts to wind-energy development by opening the most areas to new ROWs.

Recreation management under Alternative C would not preclude wind-energy development in the areas closed under Alternative B, but is evaluated on a case-by-case basis to evaluate impacts to highly used recreation sites.

4.6.2.3.4.4. Special Designations

Alternative C would result in substantially fewer adverse impacts to wind-energy development in its management of Congressionally Designated Trails because wind-energy development is allowed outside the ¼-mile buffer around the trails. Trails management under Alternative C manages 58,536 acres with wind-energy potential as open to wind-energy development; all but 867 of those acres are closed under Alternative B. In addition, Alternative C has none of the limitations on crossing the NHTs that are included under Alternative B and, to a lesser extent, would improve the ability to install north-south transmission lines.

Alternative C does not manage any waterway segments as eligible and suitable for inclusion the NWSRS, so there would be no adverse impacts to wind-energy development from these areas management. However, as stated previously, these areas contain little potential for wind-energy development.

The management of special designations under Alternative C would reduce adverse impacts to the wind-energy program compared to the other alternatives. Areas managed as ACECs under alternatives A and B are managed with standard stipulations under Alternative C. Consequently, Alternative C management of areas designated under other alternatives would result in no adverse impacts to wind-energy development. Alternative C allows wind-energy development in 100 percent more special designations than Alternative A and B as well.

4.6.2.3.5. Alternative D

4.6.2.3.5.1. Program Management

Alternative D opens 459,720 acres for wind-energy development; 972,794 acres are renewable energy exclusion areas and 961,696 acres are avoidance areas (Map 100).

4.6.2.3.5.2. Resources

Alternative D would result in more adverse impacts to the renewable energy program than Alternative A, and substantially more than Alternative C, because it includes more restrictions on surface disturbance for the protection of soil, water, and other resources. Alternative D would result in many fewer impacts than Alternative B, because B has more restrictions on surface disturbance for the protection of soil, water and other resources.

The more acres managed for wilderness characteristics, the more adverse impacts to the renewable energy program. Alternative D manages slightly fewer acres of lands with wilderness characteristics as non-WSA lands with wilderness characteristics than Alternative B. The management of these areas could result in substantial adverse impacts to wind-energy development in the acquired land in the Little Red Creek Complex near Dubois, which has high wind-energy potential.

Protections for wildlife, fish, and special status species under Alternative D would result in more adverse impacts to wind-energy development than Alternative A, and substantially more than Alternative C. Alternative D would result in fewer adverse impacts from wildlife protections than Alternative B, and closes less area to surface disturbance in lands with wind-energy potential than that alternative. This more restrictive management might mean little, because under any alternative, the BLM is required to manage to protect special status species. However, Alternative D explicit avoidance and closure would result in much more adverse impact to wind-energy development than managing on a case-by-case basis, as under Alternative C.

Alternative D greater sage-grouse management would be much less adverse to wind-energy development than Alternative B, because Alternative D limits the exclusion area of greater sage-grouse protections to the Core Area while Alternative B applies them to all nesting habitat. There are 57,669 more acres of land open with wind development potential in Alternative D compared to Alternative B. In addition, the Alternative D surface disturbance cap is double that of Alternative B (as opposed to alternatives A and C, which have no cap). Like Alternative B, Alternative D limits energy projects, including wind, to one project per section (640 acres).

Alternative D management of cultural and paleontological resources is similar to that of Alternative A and would result in the same level of adverse impacts to wind-energy development. While some projects might need to be relocated, cultural resource management would not be likely to preclude a wind-energy project. Management of Warm Springs Canyon Flume would theoretically result in fewer adverse impacts to ROWs than Alternative B. However, this difference would not substantially change the impacts because all alternatives manage the area as a ROW exclusion area, which includes wind-energy development, due to slope limitations and the adjoining USFS wilderness areas.

VRM under Alternative D would result in substantial adverse impacts to wind-energy development, even in VRM Class III areas, because of the linear nature of transmission lines and the high profile and dispersed nature of wind-energy developments. This impact would increase the likelihood that wind-energy projects would not meet VRM objectives. Alternative D VRM would result in more adverse impacts to wind-energy development than Alternative A, substantially more than Alternative C, but fewer than Alternative B. It is not possible to quantify this difference because VRM is applied on a case-by-case basis and adverse impacts depend on the degree of contrast. However, in general, the more acres managed as more restrictive VRM Classes, the more adverse the impacts to wind-energy development. Alternative D includes less restrictive VRM management than Alternative B, and therefore would result in fewer adverse impacts to wind-energy development than Alternative B. Conversely, Alternative D would result in more adverse impacts to wind-energy development than Alternative A and substantially more than Alternative C.

4.6.2.3.5.3. Resource Uses

Alternative D mineral management would result in substantially more adverse impacts to wind-energy development than Alternative C, and somewhat more than Alternative A. Alternative D closes more acres to mineral activity in areas with wind-energy potential, but substantially less than Alternative B. Management of solid mineral leasing, mineral material disposals, and locatable minerals could result in adverse impacts under Alternative D. Under Alternative D, wind-energy development, like oil and gas development, is subject to a 5 percent surface disturbance cap regardless of cause of the disturbance. Disturbances on private and state lands and disturbances on federal lands from phosphate or uranium mining or non-energy ROWs count toward the disturbance caps, which could be a limiting factor for wind-energy development (as is the case for oil and gas development). While it is not possible to calculate the potential for this adverse impact to occur, it is a conflict in management between the renewable energy program and other resource uses that is not present under Alternative A or Alternative C.

Alternative D closes more areas to motorized vehicle travel and avoids more areas for new roads than alternatives A and C, but fewer than Alternative B. However, the areas closed under Alternative D do not have high wind-energy potential, so there would be limited adverse impacts to the renewable energy program.

In addition to managing campgrounds as exclusion areas for wind-energy development and transmission corridors, like Alternative B, Alternative D manages the Beaver Creek Ski Area, the CDNST ERMA, Johnny Behind the Rocks, the Bus @ Baldwin Creek, and the Dubois Mill-Site area as exclusion areas for wind-energy development. This would result in somewhat more adverse impacts to wind-energy development than Alternative A and substantially more than Alternative C. Seasonal restrictions for recreation and travel management are not considered adverse impacts.

4.6.2.3.5.4. Special Designations

There are important differences in impacts to wind-energy development among the alternatives based on their management of special designations. Alternative D considers wind-energy development on a case-by-case basis, except in exclusion areas.

Alternative D management of Congressionally Designated Trails would result in adverse impacts to wind-energy development similar to ACEC management. Alternative D would result in substantially more adverse impacts to wind-energy development, both because of where the trails may be crossed and the buffer in which ROWs would not be likely to be approved. Alternative D management of areas in the view of the trails is based on VRM objectives, but it is unlikely that any wind-energy development would be approved within 5 miles on either side of the trails, and somewhat unlikely for a greater distance than that, depending on a site-specific analysis.

Alternative D management of NWSRS-eligible and recommended suitable waterways would result in somewhat more adverse impacts to wind-energy development than Alternative A, but the adverse impacts would be limited for the reasons stated under Alternative B.

The greater the extent to which an alternative manages areas as exclusion or avoidance areas for wind-energy development in areas managed as ACECs, the greater the adverse impacts to the renewable energy program. Alternative D ACEC designations contain 80,572 acres with wind-energy potential in exclusion or avoidance areas for wind-energy development; this is substantially fewer acres than Alternative B, but more acres than Alternative A.

4.6.3. Rights-of-Way and Corridors

In accordance with 43 CFR 2801.5(b), ROW means the public lands the BLM authorizes a holder to use or occupy under a grant or authorization. Designated ROW corridor or communication site means a parcel of land with specific boundaries identified as being a preferred location for existing and future ROWs and facilities and for which approval for use will be granted if consistent with corridor management and not in conflict with existing uses. The designated corridor may be suitable to accommodate more than one type of ROW use or facility or one or more ROW uses or facilities that are similar, identical, or compatible. The use of the word "corridor" in this analysis means designated corridors. The alternatives vary in their designation of corridors and the designation of ROW avoidance and exclusion areas.

4.6.3.1. Summary of Impacts

Adverse impacts to ROWs and designated corridors result from management actions for other resources that limit, prohibit, or otherwise decrease the potential for ROWs. When there are restrictions on ROWs, there is an implied adverse impact to the lands and realty program.

Beneficial impacts to ROWs and designated corridors result from management actions and resource uses that increase the locations open to and with the potential for ROWs and corridors. When there are fewer or no restrictions identified in this analysis, there is a beneficial impact to the lands and realty program.

4.6.3.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The BLM treats wind-energy projects (test sites and industrial wind-energy development) as ROWs; impacts to wind-energy development are addressed in the *Renewable Energy* section.
- The demand for ROW increases in conjunction with expanded oil and gas, utility, and communications development.
- Corridors and communications sites or ROW-use areas are designated as the preferred future locations for ROWs.

- Temporary and permanent ROWs for smaller distribution facilities for minerals development and transportation, power and telephone services, and access roads are expected to increase depending on the degree of development. Each ROW grant will identify whether the development will be temporary or permanent.
- The impacts of development and designation of transportation and utility ROWs would be mitigated on a case-by-case basis. Generally, this would be accomplished by locating future transportation and utility ROWs adjacent to existing facilities.
- Designated corridors are ½ mile wide, except as specifically identified under an alternative. The corridors will be designated for aboveground and/or underground use.
- Specific proposals will require site-specific environmental analysis and compliance with established permitting processes. Activities generally excluded from ROW corridors include mineral materials disposals, range and wildlife habitat improvements involving surface disturbance and facility construction, campgrounds and public recreation facilities, and other facilities that would attract public use and new oil and gas facilities. ROW facilities will not be placed adjacent to each other if resource conflicts or issues with safety or incompatibility are identified.
- To meet demand for major utility lines, companies will focus on the maintenance and upgrade of existing lines before undertaking new construction of major utility lines.
- New construction of major infrastructure (ROWs) and utility facilities will be based on public need and demand.
- ROWs will be granted to qualified individual, business, or government entities in a manner that protects natural resources associated with public lands and adjacent lands, whether administered by the government or a private entity (43 CFR 2801).
- Existing ROWs and communications sites will be managed to protect valid existing rights.
- The more restrictive VRM, the more adverse the impacts to ROWs. VRM Class I and II visual resources allow very limited to limited visual contrast with the existing landscape, and Class III has some limits on contrast. Accordingly, the more acres managed with lower VRM Classes, the more adverse impacts to ROWs. While VRM does not exclude or avoid areas for ROWs, the lower the VRM Class, the more difficult the placement of a ROW. Adverse impacts to the ROW program from VRM is more severe the larger or higher the proposed action (30-foot wide roads result in less contrast than high-voltage electrical transmission lines).
- Limits on surface-disturbing activities for the protection of other resources would have adverse impacts on ROWs and would limit areas available for corridors. The greater the restriction on surface disturbance, regardless of the resource being protected (soil, water, wildlife, etc.), the greater the adverse impact to ROWs.
- Although not an environmental impact, ROW applicants would benefit from reduced proposal processing time with the application of mitigation measures and BMPs and by co-locating proposed projects in existing disturbance and in specified areas in the planning area. This is considered a benefit to the lands and realty program.

4.6.3.3. Detailed Analysis of Alternatives

4.6.3.3.1. Impacts Common to All Alternatives

The ROD for Designation of Energy Corridors on Bureau of Land Management-Administered Lands in the 11 Western States (DOE and BLM 2008), designated energy corridor 79-216 in the planning area, a beneficial impact to the lands and realty program. All alternatives include corridor 79-216, so it is not further addressed in this section.

Proposed ROWs will be evaluated for location on a case-by-case basis except where an alternative excludes ROWs. Mitigation measures and BMPs will be applied to ensure ROWs are co-located with existing ROWs in existing disturbance where possible. This would adversely impact the ROW program, because it would restrict the location of ROWs in the planning area and could require some proposed projects to be relocated.

Mitigation measures and BMPs are applied to proposed linear ROWs such as fiber-optic cables and low-voltage powerlines to place them along currently established road systems (e.g., interstate or state highways and paved county roads). This would restrict the location of ROWs in the planning area.

The section of the Sweetwater Rocks complex known as Beef Gap is a ROW exclusion area, even if the ROWs would be co-located with existing ROWs.

Protection of grassland and shrubland resources under other programs such as ACECs would result in indirect adverse impacts to the ROW program and corridor development by limiting areas open to surface disturbance. See the *Vegetation – Grassland and Shrubland Communities* section for ROW management in these areas.

WSAs are units of the NLCS and are managed under the IMP, which precludes ROWs and corridors within WSA boundaries.

4.6.3.3.2. Alternative A

4.6.3.3.2.1. Program Management

Under Alternative A, a total of 205,916 acres are ROW exclusion areas and 66,099 acres are ROW avoidance areas.

4.6.3.3.2.2. Resources

Alternative A soil and water management that avoids disturbing soils with LRP, slopes, riparian-wetland areas, or groundwater recharge areas restricts the location of or, in some cases, precludes the development of ROWs. Even if these areas are available on a case-by-case basis, it is likely that BMPs or relocation would be required. Protections for groundwater recharge areas would limit the location or design of some projects, and in situations where these areas would not be avoided, additional BMPs would be applied to prevent contamination to these areas. This would adversely impact ROWs. However, these adverse impacts would not be likely to make an ROW infeasible.

Alternative A mitigation measures (i.e., seasonal restrictions to protect wildlife resources and critical habitat) would restrict the timing of surface-disturbing and other surface-disruptive activities, but would not preclude construction at another time of the year. This wildlife management would not adversely impact ROWs.

Alternative A management to protect special status plants by use of exclusionary areas for ROWs, restricts the location and design of facilities and in some locations precludes placement of ROWs. Mitigation measures (i.e., seasonal restrictions to protect wildlife resources and critical habitat) would restrict the timing of surface-disturbing and other surface-disruptive activities, but this would not adversely impact the location of facilities or the placement of ROWs.

Alternative A protection of cultural resources would adversely impact ROWs because mitigation measures designed to reduce impacts to cultural resources could increase costs or require different locations. The protection of the setting of sacred/spiritual/TCPs (where the setting contributes to NRHP eligibility) would be achieved through avoidance within ¼ mile of the cultural property. In rare cases, ROWs and corridors would be precluded, especially those involving higher-profile structures. Paleontological resource management could restrict the location of ROWs and corridors to avoid adverse impacts to paleontological values. The location of these resources could limit the placement of facilities or require their relocation, but would rarely preclude the action as a whole.

VRM Class I and II restrictions under Alternative A would adversely impact ROWs by limiting the amount of permissible contrast. ROWs are typically linear and often tall, so limitations on contrast would adversely impact ROW development. More contrast is allowed in Class III and IV areas, and these areas are open for ROWs and corridors on a case-by-case basis. Under Alternative A, 11 percent of the planning area is VRM Class I or II; 89 percent of the planning area is VRM Class III or greater.

4.6.3.3.2.3. Resource Uses

Alternative A management for mineral resources is generally compatible with ROWs and could result in beneficial impacts to ROWs to the extent that ROWs are developed in conjunction with oil and gas or uranium development. Recreation management precludes or limits ROWs in developed recreation sites, an adverse impact to the ROW program. See Chapter 2 for a list of this management and associated acres. Travel management limitations that close areas to motorized vehicle use adversely impact the ROW program. However, Alternative A closes only 5,923 acres to motorized vehicle travel.

4.6.3.3.2.4. Special Designations

Alternative A management to protect resource values in special designation areas would adversely impact the lands and realty program by avoiding certain ACECs for major ROWs unless no other location is possible. All ROWs in ACECs or other special designations are reviewed on a case-by-case basis, with mitigation measures applied through activity-level planning, and may be denied or possibly relocated. This would result in a potential major long-term adverse impact to the lands and realty program. Protections of Congressionally Designated Trails would adversely impact the ROW program by limiting or precluding development within ¼ mile of the trails and could limit the places where ROWs could cross NHTs. This would be a long-term adverse impact.

Under Alternative A, communications facilities are authorized under site-specific leases on a case-by-case basis. ROW avoidance areas are voided for any and all ROWs, including communications sites. Communications sites are located in areas where completed Communication Site Management Plans (Horse Heaven, Atlantic City/South Pass, Crooks Mountain, and Cedar Rim) are located.

4.6.3.3.3. Alternative B

4.6.3.3.3.1. Program Management

Under Alternative B, a total of 1,919,029 acres are ROW exclusion areas and 315,219 acres are ROW avoidance areas. Designated ROW corridors areas make up 15,364 acres, or less than 1 percent of the planning area.

4.6.3.3.3.2. Resources

Alternative B protections for soil and water resources would adversely impact the ROW program more than Alternative A, because Alternative B protects substantially more areas from surface disturbance. This management would require more relocation of ROWs, would preclude more ROWs, and could require more BMPs and mitigation than Alternative A. In particular, riparian-wetland management under Alternative B would be likely to require the relocation of or exclude some projects that would be available under Alternative A. Limitations to protect lands with wilderness characteristics under Alternative B would have more adverse impacts on ROWs than Alternative A, which does not specially manage these areas.

Management protections for wildlife under Alternative B would result in more adverse impacts to ROWs than Alternative A, because Alternative B applies more timing restrictions and distances and makes more areas ROW avoidance or exclusion areas. While some of these protections would not adversely impact ROWs because they limit only the time of construction and not the ROW authorization, the areas that are ROW avoidance or exclusion areas would adversely impact the lands and realty program unless, on a case-by-case basis, it can be shown that there would be no impacts to the species.

Adverse impacts to ROWs from protection of special status plants under Alternative B would be the same as under Alternative A. Adverse impacts from management of special status wildlife would be much greater under Alternative B than under Alternative A because Alternative B places substantially more limitations on ROWs. Particularly regarding protections for greater sage-grouse, Alternative B opens fewer areas to ROWs and places more restrictions on the allowable height of poles or structures. This would restrict or preclude many utility ROWs. Alternative B management to remove duplicative roads also would adversely impact ROWs.

Alternative B protection of special status species and other wildlife habitat in the Dubois area not already included in an ACEC would be much more adverse to ROWs than Alternative A, because only ACECs in this area are ROW avoidance areas while the entire Dubois area is an exclusion area for major ROWs. The importance of this difference might mean little considering the low demand for major ROWs and the fact that minor ROWs are still allowed although avoided.

Because Alternative B includes a substantially larger ROW avoidance area around the setting of sacred/spiritual/TCPs (where the setting contributes to NRHP eligibility) than Alternative A, adverse impacts to ROWs would be substantially greater. There would be fewer ROWs and corridor projects completed due to the increase in distance from the cultural property, but it would not be likely that such avoidance would preclude most developments. Management of paleontological resources under Alternative B would result in more adverse impacts to ROWs than Alternative A by excluding non-ACEC National Natural Landmarks from ROWs. The demand for ROWs in these areas might be limited, so the degree of adverse impacts to the lands and realty program cannot be determined. However, in the Beaver Rim area, there could be substantial adverse impacts to ROWs.

Alternative B VRM would result in substantially more adverse impacts to ROWs than Alternative A, because Alternative B designates many more areas as VRM Classes I and II and designates fewer areas as VRM Classes III and Class IV. Alternative B manages 56 percent of the planning area as VRM Classes I or II and 44 percent as Classes III and IV.

4.6.3.3.3.3. Resource Uses

Mineral development is much more limited under Alternative B than Alternative A, which would result in secondary adverse impacts to the ROW program because it limits the areas where ROWs for oil and gas, uranium, and other development can occur. Primarily, these limits are to protect the resources described above, such as greater sage-grouse or soils. Alternative B would result in more beneficial impacts to the ROW program than Alternative A to the extent that Alternative B designates more corridors. While these beneficial impacts could be outweighed by adverse impacts from other management, including limiting major ROWs to the designated corridors (an adverse impact), Alternative B would facilitate the approval of ROWs within designated corridors.

Alternative B recreation and travel management would result in more adverse impacts to ROWs because the alternative includes more areas as ROW exclusion areas, including areas that are only avoided under Alternative A, and closes more areas to motorized vehicle travel, which prohibits ROWs in the areas. Alternative B closes 2.7 percent more of the planning area to motorized vehicle travel than Alternative A.

4.6.3.3.3.4. Special Designations

Alternative B management to protect ACECs and special designations would result in many more adverse impacts to ROWs than Alternative A. Alternative B manages substantially more areas as ROW and wind-energy development avoidance and exclusion areas, particularly in association with NLCS units, and would require project relocations in many areas. Alternative B opens only 867 acres with wind-energy potential to development. Alternative B closes the remaining areas of high wind-energy potential due to special designations. Alternative B limitations on locations for crossing Congressionally Designated Trails would result in more adverse impacts to ROWs than Alternative A. Limits on ROWs in the buffers around trails would result in greater adverse impacts to ROWs, although ROWs that cannot be seen from trails are allowed. Alternative B trails management for highly visible projects, such as high-voltage transmission lines, would result in major adverse impacts to ROWs. Alternative B management of NWSRS-eligible waterways managed as suitable for inclusion in the NWSRS makes more acres (9,919) exclusion areas for wind-energy development and transmission lines.

Alternative B allows major ROWs in the following locations: Lost Creek Corridor, which runs north-south from Wamsutter to Lysite (approximately ¼ mile wide, except near NHTs, where it is 400 feet wide); approximately 10 miles of corridor connecting Lost Creek and the Casper Field Office designated corridor; and corridor 79-216 with a 3,500-foot width. While ROWs in these corridors would be processed faster, a benefit, no ROWs would be approved anywhere else in the planning area, which would adversely impact the ROW program compared to Alternative A.

Under Alternative B, communications facilities will be co-located within the following existing sites: Atlantic City, Black Rock, Cedar Rim, Crooks Mountain, Gun Barrel, Horse Heaven, and

Muskrat. This would restrict the location of communications sites in other areas, and adversely impact the lands and realty program compared to Alternative A.

4.6.3.3.4. Alternative C

4.6.3.3.4.1. Program Management

Under Alternative C, a total of 147,053 acres are ROW and corridor-development exclusion areas, 11,714 acres are ROW and corridor-development avoidance areas, 660,908 acres are designated as corridors, and the remainder of the planning area is open for ROW and corridor development.

Alternative C allows major utility ROWs in designated corridors and almost everywhere else on a case-by-case basis. Designated corridors up to 3 miles wide are allowed in Alcova Boysen Transmission Line, Beaver Creek CO_2, Beaver Creek North to the Reservation, Bison Basin Road, CIG near Muddy Gap, Frontier-Exxon-Anadarko, Highway 20/26, KN East West Gas Pipeline, Lost Creek, PP&L powerline, Shoshoni-Badwater, Sinclair near Pathfinder Reservoir, WAPA – Pacificorp Transmission, and West Wide.

Alternative C places the fewest restrictions on ROWs and would result in the fewest adverse impacts to ROWs, including corridors, of all alternatives.

Alternative C allows communications facilities under site-specific leases on a case-by-case basis, and does not require them to be co-located. This is the least restrictive of the alternatives, and would result in the most beneficial impacts to ROWs.

The most important difference in impacts to the ROW program under Alternative C is in its management of special designations. Areas managed as ACECs under alternatives A and B, including ROW avoidance and exclusion areas are managed with standard stipulations under Alternative C. Consequently, Alternative C ACEC management would not adversely impact ROWs. This is unlike Alternative A, which would result in moderate adverse impacts, and Alternative B, which would result in major adverse impacts. Although the actual effect of these differences would depend on demand for ROWs in areas managed as ACECs under other alternatives, in at least some areas (e.g., Beaver Rim and South Pass), the demand could be high and the difference important.

4.6.3.3.4.2. Resources

Alternative C would result in the fewest adverse impacts to the ROW program because it restricts surface disturbance less than any other alternative for the protection of soil, water, and other resources, and substantially less than Alternative B. Alternative C is the same as Alternative A in its lack of special management of lands with wilderness characteristics, so it would not adversely impact the ROW program through that management. The absence of such management could limit adverse impacts to the ROW program if demand for ROWs to access forest resources in the acquired land in the Little Red Creek Complex near Dubois increases.

Protections for fish, wildlife, and special status species under Alternative C would result in fewer adverse impacts to the ROW program than any other alternative. Therefore, those protections would be less likely to result in a change in location or design of ROWs than Alternative B. The difference in adverse impacts between alternatives A and C would likely mean little, because under all alternatives the BLM must specially manage to protect special status species. Therefore, even without RMP prescriptions such as limitations on the height of structures in greater sage-grouse Core Area, the BLM would consider each site-specific project for adverse impacts in the Core Area and would analyze the height of proposed structures. Across the planning area, Alternative C would result in the fewest restrictions for the benefit of resources and therefore would result in the fewest adverse impacts to the ROW program. However, management under Alternative C would be likely to accelerate the downward trend in greater sage-grouse populations and would be the alternative most likely to lead to greater sage-grouse listing under the ESA.

Alternative C management for the protection of cultural and paleontological resources is the same as Alternative A, so adverse impacts to ROWs would be the same as under Alternative A and less than under Alternative B. Alternative C manages fewer areas as VRM Classes I and II and more areas as VRM Classes III and IV than alternatives A and B. Therefore, Alternative C places many fewer limitations on the ROW program. See the *Visual Resources* section for acres of VRM Classes under Alternative C.

4.6.3.3.4.3. Resource Uses

Alternative C designates the most corridors and places the fewest restrictions on ROW locations, including major ROWs. Therefore, Alternative C would result in the fewest adverse impacts to the ROW program of all of the alternatives, and substantially fewer adverse impacts than Alternative B.

Under Alternative C, no ROWs or corridors will be considered in the following developed recreation sites: Atlantic City Campground, 181 acres; Big Atlantic Gulch, 181 acres; Cottonwood Campground, 80 acres; lands adjacent to the Fremont County Campground, 20 acres; Miners Delight, 239 acres; and Wildhorse Point, 20 acres.

Under Alternative C, limitations for ROWs will be evaluated on a case-by-case basis in the following areas: the Beaver Creek Ski Area, the CDNST ERMA, Johnny Behind the Rocks, the Bus @ Baldwin Creek, the Dubois Mill-Site area, including the Muskrat Basin ERMA of Mule Deer hunt area 90 and Antelope hunt area 67 and the Agate Flats ERMA of Antelope hunt areas 68, 69, and 106.

Alternative C closes the fewest areas to motorized vehicle travel and includes the fewest roads with travel limited to designated roads and trails. Therefore, Alternative C would result in the fewest adverse impacts to ROWs.

4.6.3.3.4.4. Special Designations

Alternative C would result in fewer adverse impacts to the ROW program in its management of the Congressionally Designated Trails because only the ¼-mile buffer on each side of trails is excluded to ROWs. In the case of NHT management, this difference would be substantial due to the very large area closed to trails crossings and the broad buffer around trails under Alternative B. In addition, management of the CDNST requires moving the trail if there is a conflict with another use and safety issues are involved. This management would be beneficial to the ROW program, and substantially beneficial compared to Alternative B.

4.6.3.3.5. Alternative D

4.6.3.3.5.1. Program Management

Under Alternative D, a total of 829,332 acres are ROW and corridor-development exclusion areas, 1,047,966 acres are ROW and corridor-development avoidance areas, 53,599 acres are designated as corridors, and the remainder of the planning areas is open for corridors on a case-by-case basis.

4.6.3.3.5.2. Resources

Alternative D would result in more adverse impacts to the ROW program than Alternative A, and substantially more than Alternative C, because Alternative D places more restrictions on surface disturbance for the protection of soil, water, and other resources than alternatives A and C, but substantially fewer than Alternative B. The more acres managed to preserve wilderness characteristics, the more adverse the impacts to the ROW program. Alternative D manages slightly fewer acres of lands with wilderness characteristics as non-WSA lands with wilderness characteristics than Alternative B.

Alternative D protections for fish, wildlife and special status species would result in more adverse impacts to the ROW program than Alternative A, and substantially more than Alternative C, which is likely to result in a need to change the location or design of ROWs than alternatives A and C. Alternative D would result in fewer adverse impacts than Alternative B from wildlife protections. However, in effect, this more restrictive management might mean little because under all alternatives the BLM must specially manage to protect special status species. Therefore, even without RMP prescriptions such as limitations on the heights of structures in the Core Area, the BLM would consider each site-specific project for adverse impacts in the Core Area and analyze the height of proposed structures. The one area in which Alternative D management of special status species could result in substantially less adverse impact to the ROW program than Alternative B is that greater sage-grouse Core Area surface disturbance calculations are applied only to energy ROWs and transmission lines. This is analyzed in detail in the *Renewable Energy* section.

Alternative D management of cultural and paleontological resources is similar to Alternative A and would result in the same adverse impacts. ROWs could need to be relocated, but cultural resource management would not be likely to preclude ROWs. Management of Warm Springs Canyon Flume could result in fewer adverse impacts to ROWs under Alternative D than under Alternative B, but the difference would mean little because the area is a ROW avoidance area under all alternatives due to slope limitations and adjoining USFS wilderness areas.

Alternative D would result in more adverse impacts to ROWs from VRM than Alternative A, substantially more than Alternative C, and fewer than Alternative B. It is not possible to quantify this difference because VRM is applied on a case-by-case basis and adverse impacts would depend on the degree of contrast. However, the more acres managed for more restrictive VRM objectives, the more adverse the impacts to ROWs. See the *Visual Resources* section for a comparison of the numbers of acres in each VRM Class. VRM can often result in substantial adverse impacts to the ROW program, even in Class III areas, because of the linear nature of ROWs and, in the case of powerlines, their high profile, which increases the likelihood that the ROW would not meet VRM objectives.

4.6.3.3.5.3. Resource Uses

Alternative D designates more corridors and places fewer restrictions on ROW locations, including major ROWs, than Alternative B, and therefore would result in fewer adverse impacts than Alternative B. Although Alternative D designates more corridors than Alternative A and in that regard would result in more beneficial impacts to the ROW program than Alternative A, Alternative D manages more areas as ROW exclusion areas than Alternative A, which would offset this beneficial impact. Alternative D allows major utility ROWs in designated corridors and in other places under some circumstances. Designated corridors up to ½ mile wide are allowed except where the corridor crosses an NHT, where it could be only ¼ mile wide or less. With the exception of Alternative B, these substantial restrictions would result in the greatest adverse impacts to ROWs.

Recreation management in Alternative D, in addition to the closure of campgrounds to ROWs and corridors common to all alternatives, excludes the Beaver Creek Ski Area, the CDNST ERMA, Johnny Behind the Rocks, the Bus @ Baldwin Creek, and the Dubois Mill-Site area to ROWs, which would result in more adverse impacts to the ROW program than Alternative A, and substantially more than Alternative C. Seasonal restrictions for recreation and travel management are not adverse environmental impacts.

Alternative D closes more areas to motorized vehicle travel and avoids more areas for new roads than alternatives A and C, but fewer than Alternative B. The more ROW avoidance and exclusion areas, the greater the adverse impacts to the ROW program.

Alternative D identifies more sites for co-location of communications facilities, and therefore would result in more beneficial impacts to the ROW program than alternatives A, B, and C, even though Alternative D closes two sites included under Alternative B when the existing leases expire. Alternative D also would result in more beneficial impacts than Alternative B because other locations would be considered for communications sites if the designated sites are unsuitable, whereas no additional sites will be allowed under Alternative B. Alternative D would result in more adverse impacts than Alternative A or Alternative C, which consider new communications site locations. Alternative D consolidates communication sites, thus fewer new sites are authorized.

4.6.3.3.5.4. Special Designations

There would be important differences in impacts to the ROW program among the alternatives based on their management of special designations.

Alternative D management of Congressionally Designated Trails would result in similar adverse impacts to ROWs as ACEC management. Alternative C would result in the fewest adverse impacts because ROWs are limited in the fewest areas. Alternative A is most similar to Alternative C management than any other alternative, but would result in more adverse impacts because of more restrictions on where ROWs may cross trails. Alternative D would result in substantially more adverse impacts both in where trails may be crossed and the buffer in which ROWs are excluded. Alternative D also includes special management for major ROWs in the viewshed of trails, which would adversely impact ROWs much more than under Alternative A. However, Alternative D would result in fewer adverse impacts than Alternative B, potentially substantially fewer.

The more an alternative manages ACECs as ROW avoidance or exclusion areas, the greater the adverse impacts to the ROW program. Areas designated as ACEC under alternatives A and B are managed as ROW avoidance or exclusion areas under those alternatives, while those same areas are managed as open to ROWs with standard stipulations under Alternative C. Alternative D management of ACECs includes 21 percent more avoidance areas than Alternative A and 1 percent fewer than Alternative B. Alternative D includes .011 percent fewer acres of ROW exclusion areas, than Alternative B. The actual impact would depend on the degree to which there is demand for ROWs; if there is no demand there would be no adverse impact from ROW avoidance or exclusion areas.

4.6.4. Comprehensive Trails and Travel Management

The travel system is managed to achieve the goals and objectives of each alternative and to provide for appropriate public access. This program is considered a support function for all BLM programs. Therefore, the goals of the trails and travel management program (as discussed in Executive Order 11644 and 43 CFR 8340) are as follows:

- Provide and improve sustainable access for public needs and experiences.
- Protect natural resources and settings.
- Minimize conflicts among the various users of BLM-administered lands.

As a result of the (sometimes divergent) program goals discussed above, impacts to travel management cannot be completely labeled as adverse or beneficial; instead impacts to travel management represent a given areas travel management focus or priority. To facilitate impact analysis of the various alternatives, the following impact parameters would be the focus of this analysis:

- The minimum standard for protecting natural resources is planning for route densities and locations that meet or exceed Wyoming Standards for Healthy Rangelands. Travel management to protect resources beyond the minimum is considered an increased resource protection focus. Areas with an increased protection focus will be managed to meet minimum standards for providing sustainable access for public needs and experiences. When conflicts between travel and resources exist within this area, travel would be constrained by the needs of the resource(s). Such a decision would result in a beneficial impact to the comprehensive trail and travel management goal of protecting natural resources, but would result in an adverse impact to visitor access.

- The minimum standard for providing sustainable access for public needs and experiences is planning for route densities and locations in consideration of primary travelers. Travel management to enhance access beyond the minimum objective is considered an increased access focus. Areas with an increased access focus will be managed to meet minimum standards for protecting resources. When conflicts between travel and resources exist within this area, impacts to resources may occur (within the limitations of existing laws and policies) to accommodate access. Such a decision would result in a beneficial impact to the comprehensive trail and travel management goal of providing access, but would result in an adverse impact to the protection of resources.

4.6.4.1. Summary of Impacts

Table 4.25, "Travel Designations by Alternative" (p. 982), Table 4.26, "Areas Closed to Motorized Vehicles By Alternative" (p. 983), Table 4.27, "Acres Designated for Over-Snow Travel" (p. 983) and Table 4.28, "Acres Designated for Mechanized (Bicycle) Travel" (p. 983) list travel designations by alternative. In addition to the impacts discussed in the introduction section of this section; areas closed or limited to a specific type of travel represent an adverse impact to that mode of travel. The overall impact to travel management from such decisions may be offset due to the fact that a closure may benefit another form of travel, such as a closure to motorized travel which would beneficially impact nonmotorized travel. The tables below summarize the travel designations by alternative for all forms of travel.

Table 4.25. Travel Designations by Alternative

Trails and Travel Management	Alternative A	Alternative B	Alternative C	Alternative D
Acres open to cross-country travel	0	0	0	0
Acres limited to existing routes	2,226,504	2,128,741	2,337,958	2,214,041
Acres limited to designated routes	163,075	193,704	50,776	154,912
Acres limited seasonally	111,002	116,805	0	110,669
Acres closed to motorized vehicle use	5,923	71,761	5,472	25,425
Total Planning Area Acres	2,394,210	2,394,210	2,394,210	2,394,210
Source: BLM 2009a				

Table 4.26. Areas Closed to Motorized Vehicles By Alternative

Location	Alternative A Acres Closed	Alternative B Acres Closed	Alternative C Acres Closed	Alternative D Acres Closed
Castle Gardens	78	8,469	0	Same as Alternative C
Copper Mountain Wilderness Study Area	0	6,936	0	Same as Alternative B
Dubois Badlands	4,561	4,561	0	Same as Alternative B
Lankin Dome	0	6,347	0	Same as Alternative A
Miller Spring	0	6,697	0	Same as Alternative A
Savage Peak	0	7,178	0	Same as Alternative A
Split Rock	0	13,964	0	Same as Alternative A
Sweetwater Canyon	0	9,135	0	Same as Alternative A
Whiskey Mountain	0	519	0	Same as Alternative B
Bus @ Baldwin Creek	0	1,159	0	Same as Alternative B
Dubois Mill Site	0	608	0	Same as Alternative B
Johnny Behind The Rocks (Cedar Rim)	0	5,594	0	Same as Alternative B
Sinks Canyon Climbing	0	139	0	Same as Alternative B
Little Red Creek Complex	0	5,490	0	4,954
Baldwin Creek Canyon	0	2,349		Same as Alternative B
Total (Percent of Planning Area)	0.2	3	0	1
Source: BLM 2009a				

Table 4.27. Acres Designated for Over-Snow Travel

Designation	Alternative A	Alternative B	Alternative C	Alternative D
Closed	14,729	181,173	0	69,493
Limited	0	0	0	0
Open	2,379,481	2,213,037	2,394,210	2,324,108
Source: BLM 2009a				

Table 4.28. Acres Designated for Mechanized (Bicycle) Travel

Designation	Alternative A	Alternative B	Alternative C	Alternative D
Closed	0	63,379	0	7,660
Limited	0	201,064	0	166,928
Open	2,394,210	2,129,767	2,394,210	2,219,622
Source: BLM 2009a				

4.6.4.2. Methods and Assumptions

This section analyzes potential impacts to public access and travel from management actions and allowable uses under the various programs. Travel designations support resource management programs and are designed to help achieve other program objectives. The land use emphasis for each area guides travel designations. Therefore, proposed travel designations will adhere to the management prescriptions under each alternative, while also aligning with the theme of each alternative. Impacts to other resources and resource uses from trails and travel management are addressed in resource-specific sections of this chapter.

As explained in Chapter 2, this RMP classifies all BLM-administered lands as open, limited, or closed to motorized travel activities. For areas classified as limited, the RMP designates: the modes of travel (e.g., foot, horseback, mechanized, and motorized); limitations on time or season of use; limitations to certain types of vehicles (i.e., OHVs, motorcycles, all-terrain vehicles; mechanized defined as mountain bikes only); limitations to licensed or permitted vehicles or users; limitations to BLM administrative use only; or other types of limitations. The following discussion of impacts on trails and travel management focuses on management actions and allowable uses that restrict or facilitate travel opportunities. Management actions for the following programs would have the potential to impact travel opportunities: lands with wilderness characteristics, fish and wildlife, VRM, cultural resources, recreation, and special designations.

Methods and assumptions used in this impact analysis include the following:

- All types and modes of travel, designations, and limitations associated with public access are analyzed.
- The proposed travel designations would not affect ROW holders, permitted uses, county or state roads, or other valid existing rights. Travel closures/limitations apply only to public access.
- The demand to increase travel routes on BLM-administered lands will continue to increase throughout the planning period, especially near communities.
- The incidence of resource damage and conflicts among mechanized, motorized, and nonmotorized activities would increase with increasing use of BLM-administered lands.
- A travel management plan is not intended to provide evidence bearing on or addressing the validity of any R.S. 2477 assertions. R.S. 2477 rights are adjudicated through a separate judicial and administrative process entirely independent of the BLM planning process. Consequently, travel management planning will not consider R.S. 2477 assertions or evidence. Travel management planning will be founded on independently determined purpose and need that is based on resource uses and associated access to public lands and waters. At such time as a decision is made on R.S. 2477 assertions, the BLM will adjust its travel routes accordingly.
- Impacts to travel management occur from both limitations (e.g., wildlife stipulations, special designations, and cultural resources) and permitted uses (e.g., oil and gas development, livestock grazing, and mining).
- Due to substantial increases in use and the development of new vehicle technologies, designation of large areas as open to cross-country travel is no longer a viable management strategy. There is no motorized/mechanized cross-country travel in areas designated as limited or closed (excluding game-retrieval carts). Exceptions for motorized cross-country travel can be included in the terms and conditions of a lease or permit or by separate written authorization.
- In areas with limited-travel designations, motorized/mechanized travel is allowed up to 300 feet from designated motorized/mechanized routes for direct, not cross-country, access to dispersed campsites, provided no resource damage occurs, no new routes are created, and such access is not otherwise prohibited by the BLM Field Manager.
- Foot and horse (equestrian) access will not be restricted by travel designations that limit or prohibit motorized/mechanized travel, and foot and horse access will be allowed on all routes open to motorized and mechanized uses, unless otherwise specified.
- Administrative use authorizations are granted on a case-by-case basis with approval from the BLM Authorized Officer.
- New routes, reroutes, or closures to the travel network in the limited areas will be changed through activity-level planning with site-specific NEPA analyses.

4.6.4.3. Detailed Analysis of Alternatives

4.6.4.3.1. Impacts Common to All Alternatives

Program management actions identified as common to all alternatives would impact trails and travel management. Small closure areas (such as Rocky Ridge), limiting the distance allowed for big game carcass retrieval, and not allowing motorized travel on groomed nonmotorized winter trails would enhance the protection of resources, enhance visitor safety, enhance nonmotorized recreation, and minimize motorized vehicle conflicts with nonmotorized users. These actions also would result in reduced motorized access in small areas and on random occasions where topography is conducive (such as flat terrain and unsaturated soils) to carcass retrieval with a motorized vehicle.

In addition, several actions common to all alternatives provide for flexibility in the travel management program. These actions will allow the program to be responsive to public needs and emerging issues in the planning area.

All travel management areas in the planning area will provide route densities, locations, and/or visitor information to promote the safety of public land users and minimize resource use/user conflicts. This would allow the travel program to minimize conflicts among the various users of BLM-administered lands and promote the safety of public land users. These objectives could result in some instances where access is limited; however, this will occur through project planning and access impacts would be mitigated wherever possible.

Under all alternatives, impacts to travel would be minor and short-term along unpaved travel routes (i.e., improved roads, single-track routes, mechanized trails) that require road-surfacing-related dust abatement measures. Travelers encountering these measures in process could experience some travel delays or rerouting around the affected road sections during dust abatement and maintenance projects.

Across all alternatives at the implementation level, new route construction and existing route maintenance will be limited by design features to reduce the impacts of surface-disturbing activities on resources, resulting in some restrictions to transportation planning and access. Prohibition of surface-disturbing activities and NSO, CSU, and TLS stipulations would limit the ability of the travel program to develop a travel system that meets resource protection and resource use needs. These stipulations would narrow the options and flexibility in the travel program. In addition, TLS stipulations would restrict maintenance operations to periods when activities would be less effective due to dryer temperatures and dry soils. It is assumed that travel management decisions will reflect and benefit resource values in most areas. Therefore it is assumed that exceptions will be granted to allow for a travel system that meets planning objectives. Despite exceptions for travel management actions to protect resources, it is assumed that allowable use stipulations would limit travel planning options and flexibility to address user conflicts and/or enhance recreation opportunities. This limitation on options and flexibility will occur and correspond with areas where there are moderate and major constraints for oil and gas development, in addition to areas closed to oil and gas development (with the exception of SRMAs managed for enhanced recreation opportunities).

Limitations on motorized vehicle use and closures would reduce motorized access to the areas where these decisions are applied to protect resources or enhance nonmotorized recreation experiences. Reductions in motorized access also would result in reduced access and opportunities for handicapped or physically challenged individuals. This would especially affect individuals who depend on motorized vehicles for participation in activities. These adverse impacts would be offset somewhat by the recreation management action that would allow individuals possessing a valid WGFD disabled hunter permit or disabled hunter companion permit to use cross-country motorized travel (in all areas except those closed to motorized travel) to retrieve big game carcasses. In addition, management decisions exempt from travel management restrictions (outside closed areas) scooters or wheelchairs used by holders of valid permits.

4.6.4.3.2. Alternative A

4.6.4.3.2.1. Program Management

Based on travel management objectives for specific areas, Alternative A would result in travel management systems that provide an increased resource protection focus over 185,253 acres, or approximately 8 percent of the planning area (Table 4.29, “Travel Management Focus under Alternative A” (p. 986)). In contrast, management objectives for the remainder of the planning area would result in travel management systems that provide increased access focus on 2,208,957 acres, or 92 percent of the planning area. The assignments of these objectives is based primarily on program needs to protect resources or enhance resource uses. In addition, the assignment of acres for increased resource protection focus recognizes intensive commitments of financial and operational resources for implementation. It is feasible that as implementation was finalized on the 185,253 acres, additional acres within the 2,208,957 acres would move toward an increased resource protection focus.

Table 4.29. Travel Management Focus under Alternative A

Alternative A Travel Management Area Focus	Acres
Increased Access Focus and Minimum Standard for Resource Protection	2,208,957
Increased Resource Protection Focus and Minimum Standard for Access	185,253
Source: BLM 2009a	

In areas not identified as closed or limited to designated roads and trails, this alternative allows for cross-country motorized travel to perform necessary tasks. This would compromise enforcement of travel decisions, placing on the BLM the burden to prove that travel management violations are not occurring to facilitate a necessary task. In addition, this allowance was developed during a period when motorized vehicle use typically involved trucks. Today motorized vehicle use involves a multitude of different vehicles, resulting in variable impacts to resources. Finally, this allowance prevents the BLM from knowing where and when the use occurs, resulting in a situation in which resource impacts are not monitored or ever fully quantified or understood. For these reasons, Alternative A travel management would not meet the travel management goals of enhancing sustainable access or protecting resources.

Alternative A program management closes the Red Canyon area to over-snow travel, including motorized (year-round) and nonmotorized (seasonal). This results in enhanced resource protection but reduced access. In contrast, this alternative opens the rest of the planning area to motorized over-snow travel. Open designations would result in increased access but minimal resource protection. In addition, Alternative A does not restrict over-snow travel to a specific snow depth, which would result in increased access but would not protect resources.

Alternative A does not restrict or limit nonmotorized and mechanized travel.

4.6.4.3.2.2. Resources

As a result of resource-oriented management actions under Alternative A, a total of 70 percent of the planning area has restrictions that would limit flexibility and options in the travel management program. Primarily, these restrictions would limit BLM ability to create new roads, maintain/enhance existing roads, or implement other travel management mitigation measures. It is assumed that conflicts among resources and travel planning would be limited to solutions and mitigation options that would result in priority being given to resource protection. These restrictions would limit travel planning options and new road development, but would not change the amounts and types of access currently available in the planning area.

Specific wildlife management actions identified to protect resources from motorized vehicle travel include closing/reclaiming unnecessary roads to reduce road density and habitat fragmentation, and avoiding authorizing road development in big game crucial winter range and parturition areas. These management actions would result in travel systems that provide increased protections for these resources. The level access would be reduced as a result of these management actions is not quantifiable and access reductions would occur randomly across the planning area.

Alternative A manages 10.9 percent of the planning area as VRM Classes I and II. Impacts from this management would be similar to those described above because these VRM designations would not change the amounts and types of access currently available. VRM Classes I and II designations would limit travel planning options and new road development.

Alternative A does not include specific travel management designations (such as limited to designated) to support resource management. Instead such designations primarily correspond with management actions associated with ACECs and WSAs. Impacts from special designations to trails and travel management are discussed below.

4.6.4.3.2.3. Resource Uses

Resource uses are accommodated through leases, permits, or other management actions. In conducting activities associated with such authorizations, permit holders or lessees typically are authorized through the permit, lease, or ROW to perform activities outside existing travel management decisions and/or construct new roads to facilitate activities. Sometimes newly constructed ROWs are not available for general public access, but on most occasions in the planning area they are open to the public through the life of the project. Limitations on these activities come from stipulations on surface-disturbing activities, not the travel management designations. Therefore, resource uses in open (with standard stipulations) areas would be the most likely to adversely impact travel management. Alternative A opens 30 percent of the planning area to resource uses under standard stipulations.

The efficiency of travel planning and management in these areas would be limited, because more ROWs and authorizations for motorized vehicle use outside the travel designations would compromise enforcement capabilities and render travel planning ineffective due to a constant increase in new motorized routes. These actions would enhance access, but would not allow travel planning in these areas to provide enhanced resource protection.

SRMAs are areas where recreation opportunities and outcomes are sustained through several management decisions, including travel management. Therefore, management in SRMAs would have the potential to affect travel management and access in these areas. Alternative A includes three SRMAs, but no travel management decisions associated with these areas, therefore no impact to access would result from these allocations.

4.6.4.3.2.4. Special Designations

Alternative A designates nine ACECs, and includes travel management decisions for five of these ACECs to support management of the relevant and important values in these areas. These areas total 107,495 acres where travel planning would be focused on enhanced resource protection and minimum standards for access.

This alternative specifically restricts over-snow travel in the Red Canyon ACEC, but allows cross-country over-snow travel in the rest of the planning area. This would result in decreased resource protections and enhanced motorized vehicle access during periods when these areas would be accessible via over-snow travel.

Alternative A manages motorized travel in all WSAs (except Dubois Badlands, which is closed) to the minimum travel management decision allowed in WSAs. The management action to allow motorized and mechanized travel only on designated roads and trails that were identified during the inventory phase of the wilderness review would result in 55,338 acres managed for enhanced resource protection and minimum standards for access.

4.6.4.3.3. Alternative B

4.6.4.3.3.1. Program Management

Travel management objectives for specific areas under Alternative B would result in travel management systems that provide an increased resource protection focus over 276,338 acres, or approximately 12 percent of the planning area (Table 4.30, “Travel Management Focus under Alternative B” (p. 988)). In contrast, objectives for the remainder of the planning area would result in travel management systems that provide increased access on 2,117,822 acres, or 88 percent of the planning area. This alternative allocates more acres to resource protection through travel management planning than Alternative A, and therefore would result in fewer acres allocated to an increased access focus. These objectives are based primarily on program needs to protect resources or enhance resource uses. In addition, the assignment of acres for an increased resource protection focus recognizes intensive commitments of financial and operational resources for implementation. It is feasible that as implementation was finalized on the 276,338 acres, additional acres would move to enhanced resource protection standards. This would occur more under Alternative B than Alternative A because Alternative B identifies more areas for protective management than Alternative A. Several of these areas were left in the increased access assignment because implementation of route designation process was either viewed as too demanding on limited resources, limited feasibility due to terrain, or lower in priority then other areas.

Table 4.30. Travel Management Focus under Alternative B

Alternative B Travel Management Area Focus	Acres
Increased Access Focus and Minimum Standard for Resource Protection	2,117,822
Increased Resource Protection Focus and Minimum Standard for Access	276,338
Source: BLM 2009a	

In areas not identified as closed or limited to designated roads and trails, Alternative B provides for the standard travel management exceptions as granted by existing law and policy. This would allow for better enforcement of travel decisions than Alternative A. Finally, Alternative B only allows permitted cross-country travel. Requiring a permit for cross-country travel would ensure the BLM knows where and when the use occurs, which allows resource impacts to be monitored and quantified. For these reasons, compared to Alternative A, Alternative B would improve progress toward reaching travel management goals of enhancing sustainable access or protecting resources.

Alternative B manages over-snow vehicles the same as other motorized wheeled vehicles, and requires users of these vehicles to abide by all (seasonal and year-round) closures, stay on existing roads on 2,117,822 acres, and travel only on designated roads on 10 acres. Compared to Alternative A, Alternative B increases the level of travel management, which would result in enhanced resource protections but reduce access. This alternative manages motorized over-snow travel the same as motorized wheeled vehicles; therefore, the rest of the planning area would be closed to motorized over-snow travel. This designation would increase resource protections and decrease access compared to Alternative A.

Nonmotorized and mechanized travel is somewhat restricted or limited under Alternative B. A total of 63,379 acres are closed to mechanized travel to protect resources.

4.6.4.3.3.2. Resources

As a result of resource oriented management actions, Alternative B imposes restrictions on more acres than Alternative A that would limit flexibility and options in the travel management program. Primarily, these restrictions would limit BLM ability to create new roads, maintain/enhance existing roads, or implement other travel management mitigation measures. It is assumed that in these areas, conflicts among resources and travel planning would be limited to solutions and mitigation options that would result in priority being given to resource protection. These restrictions would limit travel planning options and new road development, but would not change the amounts and types of access currently available in the planning area.

Alternative B manages 56 percent of the planning area as VRM Classes I and II. Impacts from this management would be similar to those discussed above because these VRM designations would change the amounts and types of access currently available in the planning area. The VRM Class I and II designations would limit travel planning options and new road development.

Specific wildlife management actions identified to protect resources from motorized vehicle travel include closing and reclaiming unnecessary roads to reduce road density and habitat fragmentation, and avoiding authorizing road development in big game crucial winter range and parturition areas. These management actions would result in travel systems that provide increased protections for these resources. The level of access restrictions that would result from these management activities is not quantifiable and access reductions would occur randomly across the planning area.

Alternative B closes 5,490 acres of non-WSA lands with wilderness characteristics to motorized vehicles in the Little Red Creek Complex to protect wilderness characteristics. Alternative A does not specially manage lands with wilderness characteristics. Therefore, Alternative B would increase the area where this allocation would impact travel. This would result in travel planning that increases resource protections and minimizes nonmotorized vehicle user conflicts with motorized vehicle users. Conversely, the decision to close the area to motorized vehicles would result in decreased motorized access.

With the exception of non-WSA lands with wilderness characteristics, this alternative does not include specific travel management area designations (such as limited to designated). Instead, these designations primarily correspond to management actions associated with ACECs and WSAs. Impacts from special designations to trails and travel management are described below.

4.6.4.3.3.3. Resource Uses

Resource uses are accommodated through leases, permits, or other management actions. In conducting activities associated with such authorizations, permit holders or lessees typically are authorized through the permit, lease, or ROW to perform activities outside existing travel management decisions and/or construct new roads to facilitate activities. Sometimes newly constructed ROWs are not available for general public access, but on most occasions in the planning area these are open to the public through the life of the project. Limitations on these activities come from stipulations on surface-disturbing activities, not the travel management designations. Therefore, resource uses in areas open (with standard stipulations) to these uses would be the most likely to adversely impact travel management. Alternative B opens fewer acres than Alternative A to resource uses under standard stipulations. The efficiency and enforcement capability of travel management in these areas would be degraded due to a constant increase in new motorized vehicle routes that result from authorizations for motorized vehicle use outside travel designations. These actions would result in increased access but would not allow travel planning in these areas to increase resource protections. These impacts would occur at a lower rate under Alternative B than under Alternative A.

SRMAs are areas where recreation opportunities and outcomes are sustained through several management decisions, including travel management. Therefore, management in SRMAs would have the potential to impact travel management and access in these areas. Alternative B includes seven SRMAs totaling 307,183 acres. To support SRMA management, Alternative B closes 7,500 acres to benefit nonmotorized recreation. This would result in decreased conflicts among motorized and nonmotorized vehicle users, and enhance nonmotorized recreation opportunities and experiences. The remaining SRMA open acreage would result in travel management that would enhance recreational opportunities and experiences.

4.6.4.3.3.4. Special Designations

Alternative B designates 15 ACECs and makes travel planning decisions in 7 of these ACECs to support management of the relevant and important values in these areas. These areas total 127,749 acres where travel planning focuses on enhanced resource protection and minimum standards for access. This is an increase over Alternative A.

Alternative B closes all WSAs and proposed eligible and suitable WSRs to motorized and mechanized travel. This management action would result in 55,338 acres managed for an increased resource protection focus but reduced (compared to Alternative A) access. The alternative would also result in decreased (compared to Alternative A) conflicts among nonmotorized and motorized vehicle users by providing more areas where nonmotorized vehicle users can go without encountering impacts from motorized vehicle users.

4.6.4.3.4. Alternative C

4.6.4.3.4.1. Program Management

Table 4.31, "Travel Management Focus under Alternative C" (p. 991) display the acres under Alternative C managed for increased access and increased resource protection.

Table 4.31. Travel Management Focus under Alternative C

Alternative C Travel Management Area Focus	Acres
Increased Access Focus and Minimum Standard for Resource Protection	2,337,958
Increased Resource Protection Focus and Minimum Standard for Access	56,247
Source: BLM 2009a	

4.6.4.3.4.2. Resources

Based on travel management objectives for specific areas, Alternative C would result in travel management systems that provide an increased resource protection focus only in WSAs totaling 56,247 acres, or 2 percent of the planning area (Table 4.31, "Travel Management Focus under Alternative C" (p. 991)). In contrast, objectives for the rest of the planning area would result in travel management systems that provide an increased access focus on 2,337,958 acres, or 98 percent of the planning area. This alternative allocates more acres to increased access (through travel management planning) than Alternative A, and fewer acres to increased resource protection. Under alternatives A, B, and D it can be assumed that as the BLM finalizes implementation of travel management decisions more acres would move to enhanced resource protection standards. This would not occur under Alternative C because it identifies WSAs as the only areas where travel management would result in enhanced resource protection.

In areas not identified as closed or limited to designated roads and trails, Alternative C allows for cross-country motorized travel to perform necessary tasks. This management would compromise enforcement of travel decisions, placing on the BLM the burden to prove that travel management violations are not occurring to facilitate a necessary task. In addition, this allowance was developed during a period when motorized vehicle use typically involved trucks. Today, motorized vehicle use involves a multitude of different vehicles and results in variable impacts to resources. Finally, this allowance would prevent the BLM from knowing where and when the use occurs, resulting in a situation in which resource impacts are not monitored or ever fully quantified or understood. For these reasons, alternatives A and C would not meet the travel management goals of enhancing sustainable access or protecting resources.

Alternative C program management does not close areas to over-snow travel. The alternative allows cross-country over-snow travel (motorized and nonmotorized) anywhere in the planning during periods when snow is at least 12 inches deep or recognized as a groomed trail. If these conditions do not exist, motorized over-snow vehicles are required to stay on existing roads. This would result in enhanced access but reduced resource protections. Alternative C would result in the most (compared to alternatives A and B) acres of access for motorized over-snow travel, but the fewest (compared to alternatives A and B) resource protections. The minimum snow requirements and definition for over-snow travel would provide limited resource protections over Alternative A, which does not include any definition or snow-depth requirement for over-snow travel.

Alternative C does not restrict or limit nonmotorized and mechanized travel.

4.6.4.3.4.3. Resource Uses

Resource uses are accommodated through leases, permits, or other management actions. In conducting activities associated with such authorizations, permit holders or lessees typically are authorized through the permit, lease, or ROW to perform activities outside existing travel management decisions and/or construct new roads to facilitate activities. Sometimes newly constructed ROWs are not available for general public access, but on most occasions in the planning area these are open to the public through the life of the project. Limitations on these activities come from stipulations on surface-disturbing activities, not the travel management designations. Therefore, resource uses in areas open (with standard stipulations) to these uses would be the most likely to adversely impact travel management. Alternative C opens more acres to resource uses under standard stipulations than alternatives A and B. The efficiency of travel planning and management in these areas would be limited, because more ROWs and authorizations for motorized vehicle use outside travel designations would compromise enforcement capabilities and render travel planning ineffective due to a constant increase in new motorized routes. These actions would increase access, but would not allow travel planning to facilitate increased resource protections.

SRMAs are areas where recreation opportunities and outcomes are sustained through several management decisions, including travel management. Therefore, management in SRMAs would have the potential to impact travel management and access in these areas. Alternative C includes one SRMA totaling 608 acres, and makes no travel management decisions associated with SRMAs. As with Alternative A, this would result in increased conflicts among motorized and nonmotorized vehicle users, and decreased (compared to Alternative B) nonmotorized recreation opportunities and experiences.

4.6.4.3.4.4. Special Designations

Alternative C does not include ACECs, which would increase motorized access and limit resource protections.

As with Alternative A, Alternative C manages motorized travel in all WSAs (except Dubois Badlands) to the minimum travel management decision allowed in WSAs. The management action to allow motorized and mechanized travel only on designated roads and trails that were identified during the inventory phase of the wilderness review would result in 55,338 acres managed for an increased resource protection focus and minimum standards for access. This would be the same as Alternative A.

4.6.4.3.5. Alternative D

4.6.4.3.5.1. Program Management

Program management under Alternative D would result in impacts similar to those under Alternative B.

4.6.4.3.5.2. Resources

Impacts from resource oriented management actions under Alternative D would be similar to impacts under Alternative B.

Alternative D manages 34 percent (which is more than Alternative A but less than Alternative B) of the planning area as VRM Classes I and II. Impacts associated with VRM Classes I and II are detailed under Alternative B.

This alternative closes 4,954 acres (which is more than Alternative A but less than Alternative B) to motorized vehicles in the Little Red Creek Complex to support wilderness characteristics in non-WSA lands with wilderness characteristics. Alternative A does not specifically manage for lands with wilderness characteristics; therefore, Alternative D would result in more impacts to travel from this allocation. This would result in travel planning that increases resource protections and minimizes nonmotorized vehicle user conflicts with motorized vehicle users. Conversely, the decision to close the area to motorized vehicles would decrease motorized access.

With the exception of non-WSA lands with wilderness characteristics identified above, this alternative does not include area-specific travel management designations (such as limited to designated). Instead, these designations primarily correspond to management actions associated with ACECs and WSAs. Impacts from special designations to trails and travel management are described below.

4.6.4.3.5.3. Resource Uses

Resource uses are accommodated through leases, permits, or other management actions. In conducting activities associated with such authorizations, permit holders or lessees typically are authorized through the permit, lease, or ROW to perform activities outside existing travel management decisions and/or construct new roads to facilitate activities. Sometimes newly constructed ROWs are not available for general public access, but on most occasions in the planning area these are open to the public through the life of the project. Limitations on these activities come from stipulations on surface-disturbing activities, not the travel management designations. Therefore, resource uses in areas open (with standard stipulations) to these uses would be the most likely to adversely impact travel management. Alternative D opens fewer acres than Alternative A to resource uses under standard stipulations. Impacts to travel management and planning from opening areas to resource uses under standard stipulations are described under Alternative B. These impacts would occur at a lower rate under Alternative D than under Alternative A.

SRMAs are areas where recreation opportunities and outcomes are sustained through several management decisions, including travel management. Therefore, management in SRMAs would have the potential to impact travel management and access in these areas. Alternative C includes seven SRMAs totaling 294,541 acres. To support SRMA management, Alternative D closes 5,195 acres to benefit nonmotorized recreation. This would result in decreased conflicts among motorized and nonmotorized vehicle users, and enhance nonmotorized recreation opportunities and experiences. The remaining acreage of SRMAs would result in travel management that would provide enhanced recreational opportunities and experiences.

4.6.4.3.5.4. Special Designations

Impacts from ACECs to travel management under Alternative D would be the same as under Alternative B.

Alternative B closes the following areas to motorized travel: Dubois Badlands WSA, Copper Mountain WSA, Whiskey Mountain WSA, and the WSRs recommended as eligible and suitable for inclusion in the NWSRS. This management would result in 15,276 acres (which is more than Alternative A and less than Alternative B) managed for increased resource protections, but reduced (compared to Alternative A) access. Alternative D would also result in decreased (compared to Alternative A) conflicts among nonmotorized and motorized vehicle users by providing areas where nonmotorized vehicle users can go without encountering impacts from motorized vehicle users.

4.6.5. Livestock Grazing Management

Adverse impacts to livestock grazing management result from management actions that limit, reduce, or prohibit livestock grazing or AUMs in the planning area. In addition, management actions that degrade rangeland health (e.g., the condition of soils, watersheds, and vegetation communities) and livestock forage or that restrict the placement, construction, or maintenance of range improvement projects would result in adverse impacts. Management actions beneficial to livestock grazing include those that increase AUMs, decrease restrictions on livestock grazing, improve rangeland health or livestock forage, distribute or disperse livestock in ways that increase access to forage, or reduce the cost associated with livestock grazing management.

Direct impacts to livestock grazing result from management actions that change AUM allocations or restrict livestock grazing. Indirect impacts to livestock grazing result from management actions that affect rangeland health and productivity or that result in a change in livestock grazing management on BLM-administered public lands in the planning area.

4.6.5.1. Summary of Impacts

Alternative B would result in the greatest adverse impacts to livestock grazing; Alternative C would result in the greatest beneficial impacts. Alternative B places the most restrictions on livestock use of forage and the placement and construction of range improvements, and places the most limitations on grazing for the protection of resources. In addition, Alternative B closes lands in elk and bighorn sheep crucial winter range in the Dubois area, which would result in adverse impacts from the loss of approximately 1,837 AUMs. Overtime, Alternative B would result in the most reduction of AUMs; since range infrastructure projects would not be available as a tool to achieve progress towards rangeland health, authorized use would need to be reduced (either in number of animals or time on the allotment) resulting in increasingly greater livestock use. Alternative C places the fewest restrictions on livestock grazing management and expands the areas where range improvements can be placed for use by grazing livestock. Impacts to livestock grazing under Alternative A would generally fall somewhere between the other alternatives, and this alternative is the most likely to apply management on a case-by-case basis. Alternative D authorizes a lesser number of AUMs than Alternative C and authorizes rangeland infrastructure only through the development of a Comprehensive Grazing Strategy. Alternative D avoids the development of new rangeland infrastructure unless pursuant to a Comprehensive

Grazing Strategy in which the benefits to rangeland health from the improvements outweigh the adverse impacts.

4.6.5.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Livestock grazing is managed to meet the Wyoming Standards for Healthy Rangelands.
- Grazing management practices such as season of use, kind of livestock and stocking level modification, rest or rotational grazing, and temporary closures can maintain or improve rangeland health to meet Wyoming Standards for Healthy Rangelands requirements.
- When range improvement projects are used to improve rangeland health, they would be appropriately implemented to meet other resource values, (e.g., riparian-wetland habitats, wildlife, greater sage-grouse, wild horses, and trails). The alternatives vary in the types of projects authorized. Alternative B authorizes primarily non-infrastructure improvements such as vegetative treatments and lowered stocking rates, while Alternative C emphasizes infrastructure such as fences and water developments.
- Under all alternatives, the BLM does not define livestock grazing as a surface-disturbing activity; therefore, livestock grazing is not precluded in areas closed or avoided for surface-disturbing activities. However, range improvement projects are surface-disturbing activities and subject to surface disturbance limits.
- Any changes in grazing management, including changes in grazing preference, are based on rangeland monitoring and documented field observations, in accordance with grazing regulations (43 CFR 4110.3).
- Surface disturbances as a result of range improvement construction, such as water developments increases the likelihood of the introduction and spread of INNS that degrade rangeland health and adversely impact forage quality and quantity.
- Grazing use levels may be adjusted during times of drought.
- Management actions for other resource uses can affect livestock grazing allocation management, both adversely and beneficially.
- Reductions in public land grazing could increase the likelihood of fencing of private and state lands.
- The placement of supplements can affect the distribution of livestock grazing in grassland and shrubland communities. All alternatives require that supplements not be placed in riparian-wetlands, although the buffer varies by alternative.
- Rangeland health assessments of all allotments will be completed within 20 years.
- Demand for public land grazing use will remain static. Changing economics associated with livestock grazing are not expected to change the demand to use public lands for livestock grazing.
- Areas are identified as open or closed to livestock grazing rather than available or not available. All alternatives close areas such as the granite rock areas of Sweetwater Rocks to livestock grazing because of site-specific issues. Acres closed to livestock grazing do not vary by alternative and are not further addressed in this section. These acres are not included in the following analysis of open and closed areas.
- Livestock grazing is a “grandfathered” use in WSAs. New fencing or water developments are not allowed in WSAs. The impact of WSAs on livestock grazing is the same under all alternatives and is not further addressed in this section.
- For each alternative, the number of baseline AUMs available and reductions in AUMs is adjusted for the ratio of actual use to permitted use. Permitted AUMs are AUMs that are allowed on a permit/lease that can be used on any given year provided the forage is available.

> Actual AUMs are the AUMs actually billed for and paid for each year by the permittee/lessee. It is assumed that livestock grazing actual use at the beginning of the planning period would be approximately 73 percent of permitted use, which is the historical average use over the last 20 years. While the ratio of actual use to permitted use is projected to remain constant over the life of the plan under alternatives A, C, and D, under Alternative B the ratio is projected to increase gradually over the life of the plan to 95 percent because of substantial decreases in the number of permitted AUMs, due primarily to adjustments to meet rangeland health standards. See Appendix L (p. 1477) for further discussion regarding the methodology used to estimate AUM loss.

4.6.5.3. Detailed Analysis of Alternatives

4.6.5.3.1. Impacts Common to All Alternatives

Under all management programs, dust reduction that improves air quality reduces adverse impacts to vegetation, which ultimately affects the palatability of the forage available for livestock. Long-term adverse impacts associated with dust can shift the plant community to a different type and reduce species that livestock prefer. In general, the greater the reduction of dust the less adverse impact to livestock grazing. In addition, increased dust from activities far removed from the planning area can adversely impact vegetation and is a contributor to adverse impacts associated with global climate change.

Management actions to prevent or mitigate soil loss generally result in beneficial impacts to vegetation, which would increase livestock forage production and quality. All alternatives maintain existing watershed improvement projects. Projects designed to enhance watershed health enhance vegetative resources by reducing erosion and improving water quality, thereby increasing forage and water for livestock over the long term. However, adjustments in livestock management potentially needed to meet or maintain riparian-wetland habitat requirements, PFC, and water quality objectives could result in short-term adverse impacts to livestock grazing. Surface disturbance associated with the implementation of watershed enhancement projects would also result in short-term site-specific adverse impacts to vegetative cover and livestock forage. The greater the benefits to soil and water, the greater the long-term benefits to livestock grazing would be.

Water can be a limiting factor for livestock grazing management, especially during drought, and affects livestock health and distribution. Water developments designed to provide new water sources for livestock would result in beneficial impacts to livestock grazing through increased water availability. New water sources might also promote improved distribution of livestock by opening areas to grazing where a lack of water was previously the limiting factor, so long as a Comprehensive Grazing Strategy is in place. The alternatives vary in the extent to which water developments are authorized. Although climate change could impact the availability of water for irrigation of private lands that support the livestock grazed on public lands, that impact is not within the scope of this analysis, which does not address private lands issues.

Wildland fire and fuels management result in varying impacts to livestock grazing, depending on fire size, intensity, and climatic factors. Wildland fire can result in short-term adverse impacts such as the spread of INNS, the destruction of range improvements, the displacement of livestock, and short-term impacts to livestock forage. With proper stabilization and rehabilitation, long-term impacts of wildland fire are generally beneficial due to improvements in forage quality, quantity, and availability following fires. For a period after a fire in shrubland communities, enhanced forage production occurs as herbaceous vegetation temporarily becomes the dominant type of vegetation in these plant communities.

Vegetation treatments designed to reduce fuel hazards, improve wildlife habitat, enhance vegetation production or plant community health, or regenerate plant communities would result in long-term beneficial impacts to livestock grazing by increasing forage availability. Vegetation treatments that require rest for establishment could also result in short-term reductions in forage available to livestock, even though treatments are designed and conducted in accordance with the Wyoming Standards for Healthy Rangelands requirements. Management actions designed to improve riparian-wetland vegetation and promote biodiversity would result in long-term beneficial impacts because these systems would meet PFC. The long-term beneficial impact is that these systems would improve water quality, quantity and forage for livestock.

The presence and extent of INNS in an area is a factor in rangeland health and forage productivity. INNS displace native vegetation and, because they typically are unpalatable to livestock and wildlife, often remain ungrazed. INNS can spread or become established as a result of surface-disturbing activities, motorized vehicle use, or dispersal by grazing animals. Surface-disturbing activities include mechanical disturbance, such as construction of well and wind tower pads, roads, pits, reservoirs, pipelines, vegetative treatments, mining, and powerlines. Even when reclamation occurs, allotments where surface-disturbing activities have occurred could experience increased INNS infestations over both the short and long term. The prevention and treatment of areas infested with INNS is required under all alternatives; management of INNS could temporarily displace livestock and reduce available forage, but would also maintain or improve rangeland health and forage quality over the long term. Beneficial impacts to livestock grazing when using a different kind of animal to manage INNS would ultimately benefit the economic picture of the permittee/lessee and the vegetative resource. By grazing leafy spurge with domestic goats or sheep, not only the native vegetation benefits by reduced competition from INNS, but the permittee benefits from being authorized to use the INNS with a kind of animal that favors leafy spurge.

INNS have a direct adverse impact on livestock grazing. In the case of INNS invading rangeland and displacing native vegetation, invasive plant species are typically unpalatable to livestock and might even be poisonous. INNS such as halogeton can be introduced via roadways or pipelines and then gradually spread to adjacent native vegetation, resulting in an adverse impact to available forage for livestock. This can eventually become costly in terms of control, not only for the BLM but also for the permittees/lessees in lost forage production. Another impact would be from insects like grasshoppers. In years when grasshopper populations are at their peak, they can devastate available livestock forage. Although grasshoppers tend to be a short-term impact for a given year, INNS can result in long-term adverse impacts lasting multiple years.

Wildlife winter range and special status species habitat management adversely impact livestock grazing by restricting the placement of range improvement projects and potentially affecting the ability to implement grazing management practices using infrastructure. Management of greater sage-grouse habitat affects the location, required mitigation, design standards and installation, and cost of range improvements. In addition, the maintenance of sagebrush and understory diversity in crucial seasonal greater sage-grouse habitat could result in an adverse impact by reducing the time livestock could graze in an area, change seasons of use, and, in some cases, result in temporary removal of livestock until vegetation treatments are in place or have succeeded.

Wild horses and livestock generally rely on the same resources. The appropriate management level for the Muskrat Basin, Rock Creek Mountain, Conant Creek, Dishpan Butte, and Green Mountain Wild Horse HMAs was established under the Lander Resource Area 1993 ROD. For Crooks Mountain and Cyclone Rim/Antelope Hills HMAs, the appropriate management level was established under the May 1994 ROD and Approved Rawlins RMP. All alternatives assume that wild horse populations will be maintained within the appropriate management level through periodic gathers and the use of fertility control practices. Should these gathers and fertility treatments not occur, an increase in wild horse populations could impact livestock grazing and availability of wildlife forage. Ultimately a high number of wild horses exceeding appropriate management level could potentially affect rangeland health.

Management of cultural and paleontological resources could adversely impact livestock grazing through the removal of forage during site excavations, or through restrictions on the design and placement of range improvements. For example, the BLM requires avoidance of surface-disturbing activities in areas near significant paleontological resource sites, which could affect the placement of range improvements where infrastructure is the management technique employed. VRM could also affect the location or design of range improvements in visually sensitive areas or where the project does not meet VRM objectives.

Adverse impacts to livestock grazing are generally the result of activities that affect forage quantity/production or quality in grazing allotments, such as vegetation treatments, and management that constrains or enhances livestock grazing management. Surface-disturbing activities such as fire and fuels management and vegetation treatments, INNS management, grazing and surface disturbance restrictions intended to protect resources, and proactive management actions, result in adverse impacts to livestock grazing in the planning area. Impacts from these activities could be adverse to livestock grazing in the very short term but should result in beneficial impacts through improvement in vegetation condition in the long term.

Mining of locatable, leasable, and salable minerals affects soils and vegetation communities, and results in a loss of forage in developed areas. Surface-disturbing and surface-disruptive activities associated with all types of mineral and geophysical exploration and development are subject to application of the Wyoming Standards for Healthy Rangelands, which helps to reduce impacts to livestock forage through the application of standard mitigation. Compared to the other minerals, oil and gas, followed by uranium mining, results in the largest acreage of surface disturbance and would result in the greatest short-term and long-term adverse impacts to available livestock forage. Areas where leasable fluid minerals have been developed can be reclaimed more closely to predisturbance conditions than areas where leasable solid minerals have been developed or where locatable minerals have been developed using conventional mining techniques.

All alternatives include revegetation of areas disturbed during oil and gas drilling and other operations and would reduce the long-term adverse impacts to forage associated with those operations. There would be a permanent loss of available livestock forage in the form of limited or lost access to grazing areas from road and industrial facility development. This could result in temporary or long-term closure of affected allotments or reductions in the authorized number of AUMs where there are large developed or producing gas fields, ISR uranium mining, or open-pit extractive operations. Construction and improvement of roads associated with minerals development could provide livestock operators with better access to livestock and enhance their ability to maintain range improvements where infrastructure is used. Disturbed areas associated with nonproducing wells would result in short-term impacts, because they would be reclaimed quickly and most forage production would be restored. Although utilization levels could vary from year to year, utilization levels that remain consistently high would not be expected to meet watershed and vegetative management objectives. Adjustments in livestock management to meet these objectives could result in short-term adverse impacts, and would result in long-term adverse impacts if interim reclamation was not possible.

Land disposals or exchanges result in adverse or beneficial impacts to livestock grazing depending on whether they reduce or increase the available acres to be grazed in the form of AUMs in active grazing allotments. Typically, land disposals occur on small, isolated parcels of BLM-administered land, with the goal being the consolidation of land ownership to enhance management of resource values as, for example, the Finley 3 (No. 2102) and the Wiggins Fork (No. 2129) allotments. BLM surface acres exchanged are no longer authorized for livestock grazing. Exchange is the preferred method for all land tenure adjustments, and changes in AUMs resulting from any exchange would be site-specific and depend on the qualities of both the disposal and acquisition parcels. However, because the land acquired is often some distance from the disposal parcels, there could be adverse impacts to individual allotments due to AUM loss. However, if lands are acquired to consolidate holdings, there could be beneficial impacts to livestock grazing by facilitating access.

The development of ROWs results in both short-term and long-term reductions in forage. ROW authorizations for permanent facilities or roads result in long-term reductions in forage. Areas where ROW authorizations include only initial disturbance are reclaimed to reduce long-term adverse impacts to livestock grazing from reductions in forage.

Allowing motorized vehicle use and recreational use and development results in adverse impacts to livestock grazing through damage to soils and livestock forage, but would beneficially impact grazing management activities through improved access. Adverse impacts from allowing motorized vehicles could include gates being left open, the displacement of livestock from heavily used areas, a reduction in forage palatability from the spread of INNS along travel corridors, and an increase in dust on forage near areas of heavy motorized vehicle use. Administrative access can be given to areas closed to motorized travel where necessary.

The intent of any grazing management practice and range improvement project is to improve the quality or quantity of forage, thereby enhancing operational flexibility. As a result of implementing these practices, grazing permittees might see an increase in costs associated with more livestock herding and maintenance of range improvements. However, as for other management programs, increased costs to permittees is generally not considered an environmental impact. Under all alternatives, appropriate grazing management practices will be implemented to address rangeland health objectives in the planning area. This will be accomplished in cooperation, consultation, and coordination with grazing permittees and lessees and other interested parties.

Livestock grazing management actions are designed to enhance rangeland health, improve forage for livestock, and to meet other multiple-use objectives. Implementation of these actions is also expected to continue implementing the allotment categorization process used in the 1987 RMP. Some allotments might need to be recategorized from their current classification (Maintain, Improve, or Custodial) over time. Allotment boundaries will be managed to facilitate grazing strategies that will help achieve rangeland health objectives. These actions could include combining allotments and changing pasture boundaries.

Changes in kinds of livestock and season of use are used as tools to meet Wyoming Standards for Healthy Rangelands. These actions beneficially impact vegetative resources and ultimately provide an abundance of healthy, vigorous forage for livestock and other grazing animals. Forage supplements placed on BLM-administered lands are required to be safe for all classes of animals, including wild horses and wildlife. Stock driveways continue to be authorized in the planning area. Long-term grazing strategies recognize the need for successful reclamation objectives and are used to meet these objectives. Successful reclamation ensures that vegetation will be established as soon as site-specific conditions allow and will be placed back into production and available for livestock grazing.

All alternatives allow the development of range improvement projects (e.g., fences and spring developments) in portions of the planning area, but Alternative B severely restricts such projects. Rangeland improvement projects allow livestock managers and permittees/lessees to better implement grazing management practices and manage the distribution and movement of livestock within allotments. Adverse impacts associated with the construction of fencing, stock-water pipelines, and other rangeland improvements include long-term impacts to forage surrounding the project, and could include undesirable changes to livestock grazing patterns and distribution within an allotment, congregation of livestock around new water sources and fence lines, and changes in livestock trailing patterns that alter vegetation or affect rangeland health. Any long-term adverse impacts from rangeland improvements would be site-specific.

Table 4.32, “Estimated Reduction in AUMs by Alternative” (p. 1000) provides a summary of initial AUMs and total AUMs lost over the life of the plan.

Table 4.32. Estimated Reduction in AUMs by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Permitted AUMs				
Initial Permitted AUMs	280,813	280,813	280,813	280,813
Permitted AUMs Lost (over the life of the plan)	1,414	152,054	30,222	51,808
Net Permitted AUMs in 2027	279,399	128,759	250,491	229,005
Actual AUMs				
Initial Actual AUMs	204,993	204,993	204,993	204,993
Actual AUMs Lost (over the life of the plan)	1,031	82,672	22,135	37,820
Net Actual AUMs in 2027	203,962	122,321	182,858	167,173

Source: BLM 2011

Note: Permitted AUMs are AUMs that are allowed on a permit/lease that can be used on any given year provided the forage is available. Actual AUMs are the AUMs actually billed for and paid for each year by the permittee/lessee. The ratio of historical average authorized use to permitted use in the planning area is 73 percent. As noted in *Methods and Assumptions*, the ratio of actual use to permitted used under Alternative B is projected to increase gradually over the life of the plan to 95 percent. See the Appendix L (p. 1477) for further discussion regarding the methodology used to estimate AUM loss.

AUM Animal Unit Month

4.6.5.3.2. Alternative A

4.6.5.3.2.1. Program Management

Under Alternative A, 2,324,934 acres, or 99 percent of all surface acres in the planning area are open to livestock grazing; no acres are closed to grazing, although, as under all alternatives, approximately 69,276 acres are unavailable to grazing. Management of livestock grazing is designed to provide for protection or enhancement of other resource values. Areas excluded from livestock grazing total 2,056 acres and include campgrounds and certain riparian-wetland and vegetation monitoring exclosures. However, those acres are not considered closed under Alternative A. As indicated in the above table, Alternative A would authorize the greatest number of AUMs, both in the short term and over time.

Range improvements are important to grazing livestock under Alternative A. The range improvements that are in disrepair or not functioning as originally planned would be abandoned and reclaimed. However, this could adversely impact livestock grazing by removing a water source or fencing that might be needed to facilitate grazing management. If water was removed, livestock grazing pressure would shift to other areas in an allotment, causing higher utilization in some areas. This could essentially reduced available forage for livestock and could require a stocking rate adjustment.

Alternative A requires that range improvement projects be designed to meet allotment management objectives on a case-by-case basis. The focus of these projects under Alternative A is to meet multiple-use objectives. Continued placement of these improvement projects considers other resource values, but the emphasis is on opening areas not previously grazed by livestock. Some projects, such as water developments, would still experience impacts from livestock congregating around these water sources. If a grazing management plan is not established or is not successful, then these impacts could be adverse to the surrounding vegetation through trampling and congregation of animals.

On a case-by-case basis, forage utilization levels by livestock are established to benefit and promote healthy, sustainable rangeland ecosystems. Forage utilization levels limit forage consumed by livestock in sensitive areas, such as riparian-wetland areas. Forage utilization levels are generally measured using forage height/weight criteria based on height/weight curves. Placement of salt or mineral supplements would continue, and these would be placed no closer than ¼ mile to water. There would be more impacts to riparian-wetland systems with this minimal distance, but it would provide some relief from the impacts of livestock.

This alternative does not include forage reserve allotments, which would reduce the flexibility of providing alternative forage options to permittees whose allotments are rested following rangeland restoration activities or temporarily closed to livestock grazing due to severe drought conditions.

4.6.5.3.2.2. Resources

Alternative A management actions to prevent or mitigate soil loss generally result in beneficial impacts to vegetation, which increases livestock forage production and quality. This alternative maintains existing watershed improvement projects, uses BMPs to reduce runoff, soil erosion, and sediment yield, and subjects all surface-disturbing activities associated with mineral and geophysical exploration and development to application of the Wyoming Standards for Healthy Rangelands. Projects designed to enhance watershed health enhance vegetation resources by reducing erosion and improving water quality, thereby increasing forage and water for livestock over the long term. However, adjustments in livestock management that might be needed to meet or maintain riparian-wetland habitat requirements, PFC, and water quality objectives could result in temporary adverse impacts. Surface disturbance associated with the implementation of such watershed enhancement projects would also result in short-term site-specific adverse impacts to vegetative cover and livestock forage.

Vegetation treatments would also result in short-term reductions in forage amount, though they may improve forage quality, even though they are designed and conducted in accordance with the rangeland health requirements in the Wyoming Standards for Healthy Rangelands. Vegetation treatments designed to reduce fuel hazards, improve wildlife habitat, enhance vegetation production or plant community health, or regenerate plant communities result in long-term beneficial impacts to livestock grazing by increasing forage availability. Silvicultural treatments, which are authorized under this alternative, would move areas toward a different seral stage make more forage available for livestock grazing by stimulating herbaceous plant growth in the forest and woodland understory.

Alternative A wildlife and special status species habitat management would affect livestock grazing by continuing to restrict the placement of range improvement projects to the smallest footprint on the land; such decision would be made on a case-by-case basis. Approvals for new fences approval, fence modifications, or fence removals are decided case by case so as to not affect big game migration corridors or cause other wildlife displacement. Restrictions on fencing adversely impact livestock grazing by reducing the distribution of livestock in some areas, but these decisions are made case by case. Under Alternative A, the BLM anticipates projects would continue to be built at the same rate as in the past 20 years, with approximately 43 acres of new disturbance each year.

Alternative A management of special status plant species could adversely affect livestock grazing if a new special status plant species is discovered and it is determined that grazing would impact that species. Grazing acreage could be lost to protect the plant and its habitat.

Special status species management under Alternative A would result in a minor adverse impact to livestock grazing. Seasons of use in grizzly bear and wolf habitat might need to be adjusted, but this would be only a minor inconvenience to the permittees rather than an adverse impact to grazing management. A more substantial adverse impact would result from management for the protection of greater sage-grouse. Alternative A closes a ¼-mile buffer around greater sage-grouse leks to surface disturbance, including water development and other range improvement projects. However, only 785 acres within the ¼-mile buffer are not already served by a water development project. Other than seasonal limitations on when range improvement projects can be built, Alternative A does not limit projects in greater sage-grouse nesting areas.

Cultural and paleontological resources management under Alternative A allows development with restrictions to protect these resources. These programs require surveys and inventories on acres of proposed rangeland improvement projects, which could adversely impact grazing management by requiring relocation of projects to avoid conflicts. Surveys and inventories would determine whether a range improvement project could be placed in a desired location to facilitate livestock grazing. Site-specific mitigation measures are applied when necessary. Under this alternative the grazing program would continue to benefit from rangeland improvements that are placed to avoid or mitigate adverse impacts to cultural and paleontological resources.

Depending on their visibility, range improvement projects in areas managed as VRM Class I or II might need to be designed to minimize their contrast with the surrounding landscape or placed in locations where they would be less likely to attract the attention of viewers. In Class I and II areas, this could result in adverse impacts to grazing management through additional costs to permittees and restrictions on the placement of range improvements. Acres of VRM Classes I and II are identified in the *Visual Resources* section. All range improvement projects must be analyzed against the VRM criteria to determine if there would be conflicts; VRM Classes III and IV allow more contrast.

4.6.5.3.2.3. Resource Uses

Resource uses under Alternative A are projected to result in approximately 12,439 acres of surface disturbance on BLM-administered land in the long term. This disturbance would result in the loss of approximately 1,414 permitted AUMs over the life of the plan. Appendix T (p. 1535) lists the projected surface disturbance for each alternative by the source of the disturbance.

Locatable minerals, leasable minerals, and mineral materials disposals activities adversely affect livestock grazing because of direct forage loss. Short-term impacts of immediate forage loss results from land being explored for oil and gas, bentonite, phosphate, gold, and uranium (see the Final Mineral Occurrence and Development Potential Report for the Lander Field Office Planning Area [BLM 2009c] and Chapter 3 for a discussion of the minerals in the planning area). If the exploration does not yield sufficient potential for development, then the land is reclaimed and put back into forage production for livestock grazing. If development of the mineral resource goes forward, there are long-term adverse impacts to grazing in terms of lost acres for livestock grazing. These long-term adverse impacts are from installation of production facilities, permanent oil/gas pads, access roads, and open-pit mining activity to harvest mineral commodities. Beneficial impacts to grazing from minerals activities can be the discharge of produced water, in some cases improving distribution of grazing animals in the area or allotment where the produced water is available.

Land tenure can adversely impact livestock grazing if lands are disposed of through sale or exchange and the grazing allotment is now privately owned. Historically, land tenure has not caused adverse impacts to grazing permittees. Most of the public lands within the planning area are contiguous and land exchanges are few. A reduction in cattle and/or sheep numbers would impact permittee/lessee income levels from a loss in total number of livestock that the permittee/lessee could graze on public land. However, in the case of land exchange, land can be “blocked” to make larger more manageable units where livestock grazing would be authorized. This authorization would beneficially impact permittees and lessees by creating a larger, more viable grazing operation. Decisions about whether acquired lands would be available to livestock grazing would be made on a case-by-case basis.

Under Alternative A, 2,113,512 acres are open for industrial wind-energy development (as opposed to test sites or meteorological towers) subject to site-specific analysis. Adverse impacts to livestock grazing from wind-energy development are the surface-disturbing activities to develop pads, powerlines, and roads to operate wind-energy areas and to transmit the generated electricity. In areas of winter grazing, large ice crystals can build up on turbine blades and can be launched several hundred feet from the turbine, potentially killing or injuring livestock that graze in these areas. Small-scale solar and wind-energy projects to supply power for range improvement projects are analyzed and authorized through the range programs and are not considered under the lands and realty program.

Impacts from ROWs can affect livestock grazing when reclamation is not successful, particularly those involving linear features such as pipelines. In some cases, these ROWs might need to be fenced to protect seedlings from livestock. Fencing could prevent distribution of livestock by blocking travel corridors that cattle use to access water and forage. In addition, new seedlings attract livestock to new succulent growth of immature plants. To achieve successful reclamation, livestock might need to be temporarily removed from the allotment the ROW corridor runs through, which would adversely impact the permittee/lessee.

Under Alternative A, recreation management on public lands would not impact livestock grazing. Recreationists are able to use public lands as designated without any substantial conflicts between them and livestock use. Alternative A closes approximately 5,923 acres to motorized vehicle use. However, administrative access for permittees is available even in closed areas to access to livestock and range improvements, so this would not result in an adverse impact to livestock grazing.

4.6.5.3.2.4. Special Designations

Under Alternative A, special designations, including WSRs and ACECs, generally would not result in adverse impacts to livestock grazing. All areas historically open to grazing are open under this alternative. Livestock grazing management prescriptions for acquired lands in the Lander Slope, Red Canyon, Dubois, East Fork, Beaver Rim, Green Mountain, Cedar Ridge, Castle Gardens, Sweetwater Rocks and Government Draw/Upper Sweetwater Sage-Grouse ACECs are determined on a case-by-case basis. However, special designations adversely impact livestock grazing because range improvement projects and salt and mineral supplement sites must be at least ¼ mile away from each side of designated portions of NHTs and Regional Historic Trails, or hidden from the visible horizon, whichever is closer. To protect the historic setting of NHTs, rangeland developments might need to be relocated, which would adversely impact livestock grazing because it could limit or preclude locating the development in the most optimal place for proper livestock management.

4.6.5.3.3. Alternative B

4.6.5.3.3.1. Program Management

Under Alternative B, 2,312,095 acres, or 98 percent of the planning area, are open to livestock grazing and management is designed to provide for protection or enhancement of other resource values. Areas closed to livestock grazing are associated with campground, riparian-wetlands and other exclosures, and the following five allotments: Bear Creek No. 2112, CM Ranch No. 2126, Lime Kiln Gulch No. 2103, Spence 23 No. 2114, and Sweetwater Canyon Pasture within Silver Creek Common Allotment No. 1903. These five areas comprise a total of 12,839 more acres (less than ½ percent of the total) closed to grazing under Alternative B but not closed under Alternative A. The 2,056 acres of campgrounds and exclosures closed under Alternative B are the same locations excluded, but not closed, under Alternative A. As indicated in the above table, Alternative B would authorize the fewest AUMs both in the short term and increasingly over time as monitoring indicates a need to reduce grazing use in order to meet rangeland health.

Alternative B uses non-infrastructure livestock grazing management to maintain and enhance rangeland health, including reduced utilization and lower AUMs. Treatments of vegetation such as prescribed fires, mowing, and herbicide treatments enhance forage for livestock grazing. Adverse impacts to livestock grazing would be short-term immediately following a treatment. Long-term beneficial impacts to livestock grazing would outweigh the short-term impacts of treatment.

Adverse impacts to livestock grazing under this alternative would result from a prohibition on new range improvements if they would cause adverse impacts to other resource values. Installation of range improvements in greater sage-grouse habitat or in crucial winter range could adversely impact these resources. The development and installation of new fences, for example would not be authorized in areas that are traditional migration corridors for big game animals and wild horses.

Alternative B removes or modifies existing fences and cattleguards to enhance other resource values where there are opportunities do so. For example woven wire fences designed for domestic sheep grazing on allotments no longer grazed by sheep would be converted to fences that effectively manage cattle, but reduce impacts to wildlife (i.e., pronghorn). Beneficial impacts include the ability of livestock to use high-quality forage throughout the allotment without fences restricting their movements. Conversely, forage-use levels in sensitive areas such as riparian-wetlands would be reached faster unless active livestock herding is utilized, which would be an adverse impact to grazing because it would require removing the cattle sooner that planned.

Under Alternative B, on an allotment-by-allotment basis, stocking rates would be established to achieve an adequate residual cover for wildlife and wild horses with a likelihood that utilization would not exceed 21 to 40 percent, or light use. This use level would be adverse to livestock grazing because utilization would need to be monitored to ensure that utilization levels did not exceed this range. An adverse impact would occur to the permittee/lessee from a reduction in grazing time on the allotment, causing a reduction in forage consumption by their livestock and likely to lead to greatly reduced AUMs over time. Another adverse impact to grazing permittees/lessees would occur as a result of permittees/lessees having to spend more time herding their livestock than what has traditionally happened. This would mean the permittee/lessee would need to find alternative pasture or forage for the livestock if they are required to come off the BLM grazing allotment. A beneficial impact from light use would be that it would provide higher quality forage to livestock. It would also provide an increase in soil moisture, resulting in a greener, healthier forage later into the grazing season. Overall, light use under Alternative B would result in more adverse impacts to livestock grazing management than moderate use under Alternative A. To achieve light use, numbers of livestock would need to be adjusted or livestock would need to be moved more frequently to avoid a higher use level.

Salt and mineral supplements can be placed no closer than ½ mile to water, riparian-wetlands, and early highways and historic trails, twice the distance of Alternative A. Also, no supplements can be placed within 0.6 mile of a greater sage-grouse lek. No salt or mineral supplements would be placed on areas being reclaimed or within 3 miles either side of a National Historic or Scenic Trail. These distances are greater than under Alternative A and would result in more adverse impacts to livestock as they would have to travel further to reach the salt and mineral supplements. A benefit of this would be increased livestock distribution and utilization of forage.

Alternative B establishes and manages forage reserve allotments as opportunities arise on a voluntary basis, resulting in beneficial impacts to livestock grazing. Forage reserve allotments increase management flexibility and the ability to rest allotments following vegetation treatments, allowing more intensive vegetation treatments and the temporary removal of livestock for more effective rangeland recovery. Intensive vegetation treatments contribute to vegetation class diversity and greater long-term forage production, but also temporarily decrease forage in treated areas. Forage reserve allotments would also be used during severe droughts, providing relief to grazing operators on those allotments affected by severe drought that require rest. Additionally, forage reserve allotments would be used to provide forage for livestock permittees who have experienced wildfire on their allotment and cannot graze them until the recovery period is over. In this regard, Alternative B would result in more beneficial impacts to livestock grazing and management than Alternative A.

4.6.5.3.3.2. Resources

Alternative B prohibits surface-disturbing activities such as range improvements on slopes greater than 15 percent. This would result in a greater adverse impact to livestock grazing than Alternative A (which prohibits such activities on slopes greater than 25 percent) to the extent it limits using infrastructure so livestock could access additional acres of forage. This management would be more beneficial than Alternative A by improving water and air quality through reducing the amount of surface disturbance over Alternative A. Although the use of native plants could slow reclamation time, the vegetative cover requirements under this alternative would result in greater long-term beneficial impacts to livestock than Alternative A by requiring native species that will help meet the Wyoming Standards for Healthy Rangelands for wildlife. Long-term beneficial impacts to forage quality and stability would also result from the reestablishment of native plant communities.

Avoiding surface-disturbing and disruptive activities under Alternative B would affect more acreage than the other alternatives, and would result in more adverse impacts to the construction of range improvements and the management of livestock. Under this alternative, these activities could not occur in groundwater recharge areas, which would adversely impact the livestock grazing program because avoidance might require the redesign of a project to eliminate any potential adverse impacts to water quality from the activity. This management prescription would result in an adverse impact to grazing that would not result under Alternative A.

Vegetation treatments to reduce hazardous fuels are projected to be highest under Alternative B, which would result in the greatest projected beneficial impact to long-term forage production. Funds Alternative A utilizes for range infrastructure projects are available under Alternative B for vegetation treatments. To the extent that these funds were used for fuels reduction, risk of forage loss due to landscape-level wildfires would be reduced. However, other fire management under Alternative B would be less beneficial than Alternative A because Alternative B reintroduces fire into its historic role in the ecology of the planning area. This would have the potential to increase the likelihood of landscape-level fires, which would result in a short-term adverse impact to livestock, with the potential for long-term adverse impacts if soil resources and seed bed are damaged. However, short-term adverse impacts could be followed by long-term beneficial impacts from vigorous regrowth.

Alternative B includes the most acreage of vegetation treatments. Because a large number of allotments do not currently meet the Wyoming Standards for Healthy Rangelands, Alternative B would result in the greatest beneficial impact toward improving vegetation conditions through vegetative treatment to achieve or make progress toward achieving rangeland health in all grasslands and shrublands. This alternative would be the most effective at moving these vegetative communities toward a transitional state within the ecological site where improved forage for livestock and other beneficial impacts to rangeland health described under Alternative A would be greater. However, unless a forage reserve is available for livestock in any rest period following treatment, there would be a short-term adverse impact to grazing associated with more vegetation treatment.

Requiring livestock operators to withhold placing their livestock on BLM-administered lands for a period of 72 hours (flushing) to reduce the spread of INNS would adversely impact grazing permittees/lessees on a short-term basis. This requirement is difficult to implement because holding livestock prior to grazing public land is stressful on calves and lambs and would require hauling drinking water if the holding areas did not have water. It also could be difficult to obtain certified weed-free hay, especially in spring when hay is costly and in short supply. Impacts to livestock grazing management would be the construction of holding facilities throughout the planning area to ensure livestock do not transport INNS seed onto public lands. However, if the holding facilities were located on private lands, this would not be an impact for BLM-administered lands within the planning area. The beneficial impacts of implementing this strategy would be an overall net reduction in the spread of INNS on BLM-administered lands, and insulating permittees/lessees who manage their private lands to avoid the spread of INNS from less careful permittees. Long term, public land grazing permittees would have an incentive to reduce INNS on their private lands to avoid the costs associated with flushing before moving their livestock onto BLM-administered lands, which would be a long-term beneficial impact to livestock grazing.

Impacts from allowing the natural healing capacity of the land to make progress toward meeting PFC objectives would result in a substantially short-term adverse impact to livestock grazing. This progress would be accomplished primarily by managing the season of use and avoiding hot-season grazing (mid June through mid September) to successfully allow the land to heal. This would require that livestock be herded away from riparian-wetland areas, deferred from use, or other forms of grazing management to avoid adverse impacts to these systems. Moreover, it is possible that the identified natural community could not be established: many ecological sites have state and transition pathways that show that no management may not heal the land and that only intervention with livestock or physical means may improve land health, such as a dominant cheatgrass site that has lost perennial grass species.

However, reductions in AUMs or change of season would occur only after monitoring and rangeland health assessments are completed. It is estimated that 5 percent of the allotments per year will be assessed, so any reductions would be incremental and would occur only on allotments that did not meet Wyoming Standards for Healthy Rangelands. Similarly, beneficial impacts to livestock grazing from improvements in rangeland health would also be achieved at a rate of 5 percent per year, which could be slower than under Alternative A. Restricting the placement of salt or mineral supplements would result in greatest beneficial impact under Alternative B, because the buffer width under Alternative B is ½ mile from water and riparian-wetlands, would improve livestock distribution and utilization of upland vegetation. Additional long-term beneficial impacts include the reestablishment of healthy rangelands that provide sustainable livestock use into the future.

Compared to Alternative A, wildlife management actions under Alternative B would result in more adverse impacts to livestock grazing. Under Alternative B, the BLM does not authorize the construction of new fences and may remove existing fences to reduce habitat fragmentation. Although fences would be removed only as opportunities arise, no new fences are likely to be built under Alternative B, whereas the historic rate for building new fences would continue under Alternative A. While on a long-term basis livestock grazing would benefit by improvements in rangeland health through lower livestock use, the immediate impact following implementation of this alternative would be adverse as stocking places would be reduced.

Alternative B prohibits range improvement projects within ½ mile of BLM sensitive plant species habitat, unless a benefit to plant species would be achieved, which would result in more adverse impacts to the grazing program than Alternative A, which does not include such prohibitions. However, these adverse impacts would be of little quantitative importance because very few sensitive status species plants have been located or mapped, and some plants are in areas inaccessible to livestock, particularly Barneby's clover.

Other impacts to livestock grazing under Alternative B that would not occur under Alternative A are that forage allocations are implemented to meet big game herd requirements. By allocating forage to wildlife, there would be an adverse impact to livestock grazing through a reduction in available AUMs or forage available for livestock grazing. This would result in direct adverse impacts to the ability of permittees/lessees to maximize the use of public lands for grazing.

Greater sage-grouse management under Alternative B would result in substantially more adverse impacts to livestock grazing than under Alternative A. Alternative B does not adopt the Core Area concept, but instead buffers all leks by 0.6 mile and closes all greater sage-grouse nesting habitat to water developments. Approximately 56 percent of the planning area, some 1,339,609 acres, are in greater sage-grouse nesting habitat. However, most of this area is already served by water development projects. Only 225,833 acres (17 percent of nesting habitat) are more than 2 miles from a water development project, the maximum distance livestock will walk to obtain water. In addition, 16,283 acres (0.7 percent) of nesting habitat is within ¼ mile of the perimeters of leks, which are closed to surface disturbance, including water development projects, under Alternative A.

For the Dubois area, Alternative B implements changes in season of use to avoid conflicts with grizzly bears, which would result in an adverse impact to livestock grazing. This change in season of use likely would occur on or about June 1. Changing the turnout date would result in short-term adverse impacts to livestock operations in the Dubois Area. Permittees/lessees would not be able to move livestock off of their hay meadows until June 1, thus affecting annual hay production. This would also impact livestock nutritional needs, since animals that need to consume green grass at that time of year to aid in the production of milk for their growing calves would not have access to pastures on BLM-administered land. Grazing permittees would not be able to take advantage of the high-protein that new forage offers in spring. Beneficial impacts to rangeland vegetation and reduction in conflict with grizzly bears, currently a threatened and endangered species and BLM sensitive species, would be long-term. Vegetation would be able to achieve near mature growth and bears will have dispersed from hibernation dens and will have followed elk and their calves, rather than livestock. Managing to support grizzly bears would help support bear populations and thereby avoid more adverse management associated with grizzly population recovery. On a long-term basis, livestock grazing strategies that resulted in “take” of grizzly bears would need to be resolved in the bears' favor with adverse consequences to livestock grazing.

Impacts from wild horse management under Alternative B would be similar to Alternative A, except that fences would be removed or modified on a case-by-case basis to reduce impacts to wild horses in HMAs. Reduction of fences would adversely impact livestock grazing because livestock would not distribute properly and would congregate in some riparian-wetland areas. Livestock could move outside their traditional use areas and might even cross allotment boundaries if fences were removed or modified. This would adversely impact vegetation in areas where livestock congregate and thus adversely impact livestock grazing.

Impacts to livestock grazing from management of cultural and paleontological resources under Alternative B would be similar to Alternative A, except there would be minor additional adverse impacts in site-specific locations where Alternative B prohibits range improvement projects.

4.6.5.3.3.3. Resource Uses

Resource uses under Alternative B are projected to result in approximately 7,503 acres of surface disturbance on BLM-administered land in the long term. This disturbance would result in the loss of approximately 853 permitted AUMs over the life of the plan, the least of any alternative. Appendix T (p. 1535) lists the projected surface disturbance for each alternative by the source of the disturbance.

Under Alternative B, impacts to livestock grazing from locatable and leasable minerals development and mineral materials sales would be similar to Alternative A, although more beneficial as there would be fewer surface disturbances from these activities under Alternative B. Because Alternative B closes many more areas to surface disturbance, there would be direct beneficial impacts to vegetation and therefore benefits to livestock grazing. It is not possible to quantify on a planning area basis whether these beneficial impacts would exceed the adverse impacts of restrictions on new infrastructure.

Alternative B closes approximately 71,761 acres of BLM-administered land to motorized vehicle use, a sizeable increase from the 5,923 acres under Alternative A, which would beneficially impact rangeland health and forage palatability for livestock grazing than the other alternatives.

Alternative B closes the Sweetwater Canyon pasture of the Silver Creek Allotment to livestock grazing because of conflicts with recreational use. The impact to livestock grazing would be adverse because approximately 1,074 permitted AUMs would be cancelled in the planning area. This would cause an adjustment on an allotment-wide basis for the loss in the Sweetwater Canyon Pasture. This would impact income and the ability of permittees/lessees to meet operating costs.

4.6.5.3.3.4. Special Designations

Only 12,839 acres that are specially designated are closed to livestock grazing, which would result in very little additional adverse impact than that described under Alternative A. For all ACECs except South Pass, Alternative B prohibits new range improvement projects; this would adversely impact livestock grazing compared to Alternative A, which considers range improvement projects on a case-by-case basis.

Alternative B closes the area within 2 miles of the RHT&EHs to range improvement projects, which would result in more adverse impacts than Alternative A, which generally applies a ¼-mile buffer. However, only 47,618 acres in the 4-mile wide buffer are farther than 2 miles from water, so it is not clear how much more adverse this management would be to livestock grazing compared to Alternative A. In addition, Alternative B does not allow range improvement projects that do not meet VRM objectives within 2 to 5 miles of the ACEC.

Alternative B management of Congressionally Designated Trails would be substantially more adverse to livestock grazing than Alternative A management because Alternative B closes a much larger area around the trails to range improvement projects. However, all but 84,711 acres in the trails buffer is in the Government Draw/Upper Sweetwater Sage-Grouse ACEC, which is closed to range improvement projects under Alternative B. Of the areas within trails buffers but outside the ACEC, only 33,335 acres are more than 2 miles from water; therefore those would be the only locations the Alternative B prohibition on water developments would adversely impact livestock grazing management. In addition, fencing would not be allowed on these areas.

Alternative B management would also adversely impact the construction of range improvements along recommended eligible and suitable WSRs, but these are considered on a case-by-case basis depending on whether they enhance outstanding values and do not adversely impact WSRs. Thus, Alternative B would result in impacts to livestock grazing from this type of special designation similar to Alternative A.

4.6.5.3.4. Alternative C

4.6.5.3.4.1. Program Management

Under Alternative C, 2,324,934 surface acres are available for livestock grazing; no areas are closed to grazing. The alternative excludes, but does not close, campgrounds and other exclosures totaling 2,056 acres.

Management under Alternative C would be more beneficial to livestock grazing due to its focus on maximizing livestock forage use through the maximum implementation of range improvements instead of the protection or enhancement of other resource values, than Alternative B but likely to authorize fewer AUMs than Alternative A. (Note: all alternatives must meet rangeland health standards.) However, the alternative presents the greatest risk of adverse impacts from failure of high-intensity grazing systems and the greatest risk of managing livestock grazing so as to contribute to the listing of the greater sage-grouse under the ESA.

Range improvement projects under Alternative C are designed to maximize livestock forage and distribution. All infrastructure and non-infrastructure improvements are utilized to maintain, enhance, and achieve rangeland health. This would provide the maximum acres possible throughout the planning area for livestock grazing. Installing more range improvement projects on the land could increase available AUMs over actual use under Alternative A and still meet the Wyoming Standards for Healthy Rangelands. Such an increase would require extraordinarily successful grazing on every acre through implementation of a large-scale range improvement program under which 150 new water projects, 735 miles of riparian-wetland fencing, and 220 miles of pasture division fencing would be installed during the planning period, or 100 acres per year of surface disturbance. It is likely that this level of infrastructure would support the AUMs identified in the above table.

On an allotment-by-allotment basis in permit renewals, residual vegetation following livestock grazing would be similar to Alternative A with a likelihood that utilizations levels would be 41 to 60 percent, or moderate use, in areas livestock prefer. This action would ensure more forage for livestock than Alternative B and would be a beneficial impact to livestock grazing, at least in the short term. Impacts from salt or mineral supplement sites would be similar to those under Alternative A. Acquired lands are open to grazing. This would provide additional or new acreage for a permittee/lessee to apply for grazing use.

Alternative C does not establish forage reserves. Not having a forage reserve would reduce flexibility for livestock operators to graze other areas if they were not able to use their allotment due to landscape-level fire, vegetative treatments, or reclamation activities. Compared to Alternative B, Alternative C would adversely impact livestock grazing by reducing flexibility for the permittee/lessee to use forage reserves.

4.6.5.3.4.2. Resources

Alternative C requires avoidance of surface-disturbing activities on slopes greater than 25 percent unless no resource damage would result, generally the same as Alternative A and with fewer adverse impacts to livestock grazing than Alternative B. This provides more acreage available for installation of range improvement projects in areas with steeper slopes. Compared to Alternative B, Alternative C would make more acres of forage available for livestock grazing, but would present a greater risk of adverse impacts to soil, and therefore, vegetation in both the short term and long term. These would be indirect adverse impacts to livestock grazing.

Alternative C management of produced water and riparian-wetland areas would beneficially impact livestock grazing more than Alternative A or Alternative B. Surface disposal of produced water under Alternative C would result in a more beneficial impact to livestock grazing than Alternative A because Alternative C requires that discharged water be put to a beneficial use (e.g., for livestock watering). This alternative has fewer adverse impacts to grazing than Alternative B because there are fewer protections of floodplains or riparian-wetland areas, potentially increasing permittee/lessee flexibility in the placement of range improvements to maximize livestock grazing use in these areas.

Alternative C uses range betterment funds for infrastructure, and to a lessor extent vegetative treatments. Therefore, there would be fewer fire and fuels treatments under Alternative C, increasing the risk of forage loss due to landscape-level wildfires and increasing stress related to finding pasture for livestock following wildfires similar to Alternative A. However, this would be less beneficial than Alternative B, which uses range improvement funds for vegetation treatments rather than emphasizing infrastructure development and establishes forage reserves. Rest and deferment of treated areas would continue under Alternative C, which would result in a short-term adverse impact but a long-term beneficial impact to livestock grazing.

Alternative C includes less acreage of vegetation treatments to improve vegetation conditions and increase forage production than Alternative B, because it allocates funds for fences, water developments, and other grazing management infrastructure. Alternative C relies on intense grazing management to produce usable forage for livestock grazing, thereby benefiting the livestock grazing management if successful. This would be more beneficial to livestock grazing than the Alternative B management toward achieving historical community structure and composition of the vegetation.

Like Alternative A, there is less fire and fuels treatment under Alternative C, which would result in a greater risk of forage loss due to landscape-level wildfires, and additional stress related to finding pasture for livestock following wildfires compared to Alternative B, which uses range improvement funds for vegetation treatments rather than infrastructure and establishes forage reserves. Rest and deferment of treated areas would continue under Alternative C; however, Alternative C places more emphasis on using short-term methods, such as electric fencing, of deferring or resting areas from livestock grazing because forage reserves would not be available under Alternative C. Forest and woodlands management under Alternative C would result in the greatest beneficial impact to forage for livestock. Alternative C allows the most timber harvesting of any alternative, and earlier precommercial thinning and larger clear-cuts than Alternative A, which would improve these areas for livestock grazing. Alternative C also manages juniper and limber pine stands to enhance livestock grazing. Activities that control juniper encroachment or stimulate herbaceous growth in the forest and woodland understory would result in a beneficial impact to grazing from increased forage production. As under all alternatives, the lack of local market demand for forest products is a factor that limits BLM ability to successfully manage forest products.

Under this alternative, the intensity and frequency of wildfires would be less than under other alternatives because there would be less fine fuels due to a higher level of livestock forage utilization. However, over the long term, heavier grazing would slowly change the composition of vegetation to a less desirable mix of plant species as described in the NRCS's Ecological Site Guides and Transition Models. This would be similar to impacts under Alternative A and more impacts than under Alternative B, which allows only light use.

Salt or mineral supplements would be placed in historically unused areas to maximize livestock forage use. Although this would allow livestock greater use of upland vegetation, it would likely adversely impact upland vegetation because cattle would congregate in the areas. These adverse impacts to livestock grazing would be direct, because cattle would congregate and focus on salt or mineral supplement sites and riparian-wetland areas and not properly distribute across the landscape. This would cause lower livestock weights and place additional stress on concentrated animals; however, salt or mineral supplements, where they increase livestock distribution, will increase available forage and nutrition.

Alternative C does not require livestock flushing to prevent the spread of INNS. This action would beneficially impact permittees with INNS problems on their private lands by reducing operating costs and allowing more flexibility to move herds without the need to quarantine them. However, it could result in long-term adverse impacts by increasing the potential for establishment and spread of INNS, which could reduce forage and impact permittees who maintain INNS-free forage on their private lands.

Alternative C management of riparian-wetland resources utilizes all management tools, including rangeland improvements, to make progress toward achieving PFC. These management tools would beneficially impact livestock grazing because more projects would be made available to improve livestock distribution away from riparian-wetland systems and likely would result in the most rapid improvement of riparian-wetland areas, so long as herbivory is excluded. In some cases, this would not provide additional acres of livestock forage that might have been grazed by livestock previously. Over the planning period, approximately 735 miles of new riparian-wetland fence would be built to benefit riparian-wetland areas. In contrast, it is not likely that there would be new fences under Alternative B. New fence construction under Alternative C would beneficially impact livestock grazing by creating more pastures through which operators could rotate their livestock and provide approximately 150 new water projects. These new water projects, in conjunction with additional fencing, would increase flexibility for livestock grazing permittees/lessees throughout the planning area. However, permittee/lessee operational costs would increase considerably under this alternative because of the increase in the number of range projects that would need to be constructed and maintained.

Wildlife management actions under Alternative C would be the least restrictive to livestock grazing management. Alternative C increases the development of range improvements and gives priority to livestock in terms of allocating forage. Like Alternative A, Alternative C allows new fences in migration corridors, but considers habitat fragmentation. This would result in many fewer adverse impacts to livestock grazing than Alternative B, which prohibits new fences and removes some existing fences to reduce habitat fragmentation and to support big game migration. In areas of parturition and crucial winter range, Alternative C manages vegetation primarily to benefit livestock grazing. These impacts would be beneficial to grazing permittees/lessees because livestock use would be spread over a larger area and at a higher level of use. Development of range improvements facilitates livestock grazing in areas where grazing is not occurring because of limited water availability. Alternative C is less restrictive than Alternative B and, in many cases, less restrictive than Alternative A.

Alternative C management of special status species would result in adverse impacts similar to Alternative A. Alternative B management is more favorable to special status species and less favorable to livestock grazing because of the protections and special management requirements for other resource values.

Alternative C management of wild horses is similar to Alternative A, except that it would be more beneficial to livestock grazing because there would be greater displacement of wild horses with the construction of more fencing and water developments, thus reducing competition from wild horses. Alternative B wild horse management would be the least beneficial to livestock grazing because it includes little to no fencing.

Alternative C management of cultural and paleontological resources is similar to Alternative A. However, with the construction of additional range improvements, the number of conflicts would be expected to increase to protect cultural resources (e.g., cattle tend to walk fence lines and congregate near and around water wells and tanks, thereby increasing the risk of impacts to cultural resources), thus reducing the number of potential range improvement projects installed.

Alternative C impacts to range improvements from the management of visual resources would be similar to those under Alternative A. However, if additional fences and water developments are proposed along the historic trails, a higher level of mitigation would be required compared to Alternative A.

4.6.5.3.4.3. Resource Uses

Resource uses under Alternative C are projected to result in approximately 60,632 acres of surface disturbance on BLM-administered land in the long term. This disturbance would result in the loss of approximately 6,890 permitted AUMs over the life of the plan, the most of any alternative. Appendix T (p. 1535) lists the projected surface disturbance for each alternative by the source of the disturbance. The projected surface disturbance under Alternative C would result in the greatest long-term and short-term adverse impacts to AUMs of any of the alternatives.

Alternative C closes approximately 5,472 acres of BLM-administered land to motorized vehicle use, a decrease of approximately 8 percent compared to Alternative A. Alternative C would result in the fewest adverse impacts to permittee/lessee access, but the most potential impact to rangeland health and forage palatability of any alternative by increasing the likelihood of INNS spread.

Recreation management under Alternative C would be the same as Alternative A as it relates to livestock grazing, except that recreation management under Alternative C does not guarantee current use and emphasizes motorized recreation over nonmotorized. This would result in a trend toward a more urban industrial setting and away from the primitive setting, which would adversely impact livestock grazing. Alternative C would be less adverse than Alternative B management of closing the Sweetwater River pasture of the Silver Creek Allotment, but the beneficial impact of keeping these 1,074 permitted AUMs would be minor compared to the beneficial impacts of the Alternative B trend away from an urban industrial setting toward a more primitive setting.

4.6.5.3.4.4. Special Designations

Alternative C management does not include ACECs or recommend eligible and suitable WSRs and does not close areas to livestock grazing in such areas as under other alternatives. Therefore, Alternative C would not result in impacts to livestock grazing from management of these areas. Impacts from the management of NHTs and other trails would be similar to those under Alternative A. Special designations that protect vegetative resources or limit surface disturbance would result in beneficial impacts to livestock grazing management in those areas.

4.6.5.3.5. Alternative D

4.6.5.3.5.1. Program Management

Under Alternative D, 2,318,621 surface acres are available for livestock grazing and 6,313 allotment acres are closed to livestock grazing. Alternative D also includes the closure of 4,021 allotment acres not being grazed. Areas such as campgrounds and exclosures not being grazed total 2,056 acres and comprise 239 AUMs. Alternative D would result in fewer AUMs than Alternative C, particularly over time, as additional rangeland infrastructure would be limited to those that are part of a grazing strategy.

Management under Alternative D will be focused on achieving Wyoming Standards for Healthy Rangelands and will look at other resource values. As allotments are assessed and permits/leases renewed, available AUMs in Alternative D would be less than Alternative C. This would be less beneficial to livestock grazing than Alternative C. Alternative D focuses on development and installation of range improvement projects necessary to implement comprehensive grazing strategies leading to improved rangeland health, or to enhance successful grazing management strategies already in place. Beneficial impacts associated with the projected improvement in rangeland health should exceed the impacts associated with the project infrastructure installed. Projects would be avoided that expand livestock grazing on the landscape without a clear link to a Comprehensive Grazing Strategy and consideration of other resources. Alternative D allows range improvement projects only as part of a Comprehensive Grazing Strategy to improve or enhance rangeland health; Alternative C focuses on management to maximize livestock forage use instead of the protection or enhancement of other resource values. However, while Alternative D would present some of the risks of adverse impacts resulting from a failure of high-intensity grazing systems as Alternative C, it would present less risk because of the requirement for a Comprehensive Grazing Strategy.

Range improvement projects under Alternative D are designed to improve or enhance rangeland health. Beneficial impacts associated with any range improvement project must exceed the adverse impacts of the project. Alternative D avoids projects that would expand grazing across the landscape unless there is a clear link to the Comprehensive Grazing Strategy and consideration of other resources. In certain ACECs designated for the benefit of wildlife, range improvement projects are authorized only if they enhance the important resource values of the ACEC.

Like Alternative C, Alternative D uses both infrastructure and non-infrastructure improvements to maintain, enhance, and achieve rangeland health.

Alternative D establishes requirements for residual forage that are the same as alternatives A and C which when applied on an allotment-by-allotment basis, would likely lead to utilization that would not exceed 41 to 60 percent, or moderate use, in areas livestock prefer. This utilization would allow greater forage use by livestock than Alternative B, and would be a beneficial impact for livestock, particularly in the short term. The placement of salt or mineral supplements is similar to alternatives A and C with regard to distance from riparian-wetland areas, which would result in similar impacts as A and C in this regard. However, Alternative D is more restrictive with regard to the greater sage-grouse Core Area and NHTs where the impacts would be more adverse than under alternatives A and C. Acquired lands are open to grazing on a case-by-case basis, thus benefiting permittees/lessees. It is likely that AUMs under this alternative would be the second fewest of the alternatives.

Under Alternative D, forage reserves will be established as opportunities arise. Using forage reserves increases the flexibility for livestock operators to graze other areas if they are not able to use their allotment due to catastrophic events or vegetative treatments, or if reclamation activities could not be accomplished following a disturbance. This would be a beneficial impact to livestock grazing over Alternative C by increasing flexibility for the permittee/lessee.

4.6.5.3.5.2. Resources

Alternative D requires avoidance of surface-disturbing activities on slopes greater than 25 percent. This would result in impacts to livestock grazing similar to Alternative A, with fewer adverse impacts than under Alternative B, and with slightly more than under Alternative C. Reduced slope limitations provide more acreage for the installation of range improvement projects in those areas. Compared to Alternative B, Alternative D would result in more acres of available livestock forage, but would result in a greater risk of adverse impacts to soil (and therefore vegetation) in both the short term and the long term. Adverse impacts to soil and vegetation would be indirect adverse impacts to livestock grazing.

Forest and woodland management under Alternative D would result in less beneficial impact to forage for livestock than Alternative C, which authorizes more active forest management. Alternative D manages juniper and limber pine stands to enhance all uses. This would result in a beneficial impact to livestock grazing, but would be less beneficial than Alternative C. Activities that control juniper encroachment or stimulate herbaceous growth in the forest and woodland understory would result in a beneficial impact to grazing from increased forage production. As under all alternatives, the lack of local market demand for forest products limits BLM ability to successfully manage forest products.

Under this alternative, with comprehensive grazing strategies the intensity and frequency of wildfires would be similar to that described under Alternative B due to the presence of more fine fuels caused by shorter use periods and longer rest periods that may be implemented in the comprehensive management strategies. However, in some areas the intensity and frequency of wildfires could be about the same as under alternatives A and C, with the same levels of forage utilization by livestock. However, unlike alternatives A and C, over the long term, light to moderate grazing pressure combined with comprehensive grazing strategies would prevent a slow change to a less desirable mix of plant species. If successful, the plant mix would remain desirable for livestock grazing, as it would under Alternative B.

Alternative D includes fewer acres of vegetation treatments to improve vegetation conditions and increase forage production than Alternative B. Alternative D allocates more funds for fences, water developments, and other infrastructure, although less than in Alternative C. Alternative D relies on intensive grazing management to produce usable forage for livestock, thereby benefiting livestock grazing management where successful, although less so than Alternative C. Alternative

D may result in more opportunities for biological diversity but would result in fewer beneficial impacts to livestock grazing than Alternative C, which manages for forage production.

Salt or mineral supplements would be placed in historically unused areas to maximize livestock forage use, if part of the comprehensive management strategy. Adverse impacts to upland vegetation that could result from this placement (and other strategies to disperse cattle from riparian-wetlands) could be acceptable under Alternative D if the net beneficial impacts to the riparian-wetland areas outweighed adverse impacts to upland vegetation from livestock grazing use in these areas. Increasing livestock use on historically unused areas would also create user conflicts with wildlife species such as greater sage-grouse, pronghorn, and other big game species, but these potential adverse impacts would be considered in evaluating the Comprehensive Grazing Strategy.

Like Alternative B, Alternative D could require livestock flushing, which would result in a short-term adverse impact to grazing, but have a potential long-term benefit by reducing the spread of INNS. This action, if implemented, would adversely impact permittees/lessees with INNS problems on their private lands by increasing operating costs and allowing less flexibility to move herds without the need to quarantine or drylot them. This could result in long-term beneficial impacts by increasing the potential for establishment and spread of INNS, which reduces forage and burdens permittees who maintain INNS-free forage on their private lands.

Alternative D riparian-wetland resources management utilizes all management tools, including rangeland improvements, to make progress toward PFC, but only as part of a comprehensive management strategy. These management tools benefit livestock grazing because more projects would be made available to improve livestock distribution away from riparian-wetland systems and likely would result in the most rapid improvement of riparian-areas. In some cases, this would provide for additional forage in areas that might have never or only seldom been grazed by livestock to become available. This additional forage would be less than that under Alternative C, because the additional acres made available must have a clear link to the grazing strategy and consider adverse impacts to other resources. Over the planning period, the BLM anticipates that the construction of rangeland improvement projects under Alternative D would result in approximately 42 acres of disturbance each year, including new fence construction and water projects. New fence construction would beneficially impact livestock grazing operators by creating more pastures through which to rotate their livestock. New water projects, in conjunction with additional fencing, would increase flexibility for livestock grazing permittees throughout the planning area and would encourage an overall strategy to achieve Wyoming Standards for Healthy Rangelands. However, permittee/lessee operational costs would increase considerably under this alternative due to the increased number of range projects that would need to be constructed and maintained.

Wildlife management actions under Alternative D would result in the next most adverse impacts to livestock grazing after Alternative B, but not much more than Alternative A or Alternative C. Alternative D includes the continued development of range improvements, but focuses them as tools to implement the Comprehensive Grazing Strategy in consideration of adverse impacts to wildlife and other resources. Moreover, the adverse impacts cannot outweigh the beneficial impacts of the projects. Although Alternative D does not give priority to livestock in terms of use of forage as does Alternative C, under Alternative D this would happen by default because of the utilization levels. However, Alternative D will consider big game when considering forage use.

Wildlife management under Alternative D would result in slightly more adverse impacts to livestock grazing than under alternatives A and C because fencing would not be used in identified big game migration corridors. However, when critical to the success of a Comprehensive Grazing Strategy and compatible with a migration corridor, fencing would be considered. Similarly, Alternative D would result in slightly more adverse impacts than Alternative A or Alternative C because it authorizes water developments beneficial to livestock grazing in areas of parturition and crucial winter range only if the project is critical to the success of a Comprehensive Grazing Strategy. To reach a Finding of No Significant Impact, impacts from fencing and water development under alternatives A, C, and D must be mitigated. Therefore, the increased adverse impacts under Alternative D over alternatives A and C would be from the requirement that range improvement projects in migration corridors, crucial winter range, and parturition areas be part of a Comprehensive Grazing Strategy. All three alternatives would result in substantially fewer adverse impacts than the Alternative B prohibition of range improvement projects. Allowing range improvement projects in big game areas would be beneficial to grazing permittees/lessees because livestock grazing use would be spread over a larger area than before and at a higher level of use. The development of range improvements would facilitate livestock grazing in areas where grazing is not occurring because of limited water availability.

Management of special status species under Alternative D would result in impacts similar to Alternative, A which would result in substantially fewer adverse impacts to livestock grazing than Alternative B. Alternative D is more favorable to special status species and less favorable to livestock grazing, but would result in fewer adverse impacts than Alternative B because Alternative D adopts the Core Area approach to management for the benefit of greater sage-grouse. As a result, only the leks in the Core Area are buffered from surface disturbance by 0.6 mile, which would allow range improvement projects on an additional 8,801 acres. This would result in fewer adverse impacts to livestock grazing than Alternative B, but more than Alternative A or Alternative C. Although seasonal limitations on surface-disturbing or disruptive activities are applied over a greater area under Alternative D than under alternatives A and C, and less than Alternative B, this would not result in adverse impacts to livestock grazing, although it would reduce the time available for implementing range improvement projects.

Management of wild horses under Alternative D is more favorable than Alternative C. Construction of fencing and water developments limited to those needed for a Comprehensive Grazing Strategy, wild horses would be displaced and there would be less competition from wild horses than under Alternative A or Alternative C. Alternative B wild horse management would be the least beneficial to livestock grazing because there would be no fencing allowed that would adversely impact wild horses. Any limitations on water development outside the HMAs designed to keep wild horses in the HMA would adversely impact livestock grazing.

Management of cultural and paleontological resources under Alternative D would result in impacts similar to Alternative A, and fewer adverse impacts than Alternative C. Alternative D would create conflicts because a large number of range improvement projects would be built and use would increase (e.g., cattle tend to walk fence lines and congregate near and around water wells and tanks, thereby increasing the risk of impacts to cultural resources). Under Alternative D, these adverse impacts would be allowed if offset by the beneficial impacts of the projects to the Comprehensive Grazing Strategy.

There would be few adverse impacts to livestock grazing from management of visual resources under Alternative D, because VRM is based on meeting objectives rather than any artificial geographic scale. Adverse impacts to visual resources could be authorized under Alternative D if the impacts were outweighed by beneficial impacts from a Comprehensive Grazing Strategy.

4.6.5.3.5.3. Resource Uses

Resource uses under Alternative D are projected to result in approximately 11,453 acres of surface disturbance on BLM-administered land in the long term. This disturbance would result in the loss of approximately 1,301 permitted AUMs over the life of the plan. Appendix T (p. 1535) lists the projected surface disturbance for each alternative by the source of the disturbance.

Alternative D closes approximately 25,425 acres of BLM-administered land to motorized vehicle use, a decrease of approximately 65 percent compared to Alternative B, but 329 percent more than Alternative A. Alternative C closes 5,472 acres to motorized vehicle use. Closing areas to motorized vehicle use would result in a beneficial impact to livestock grazing; it would improve rangeland health and forage palatability by decreasing the likelihood of INNS spread. Approximately 9 percent of the land closed to motorized travel under Alternative D is also closed to livestock grazing.

Impacts to livestock grazing from recreation management under Alternative D would be the same as under Alternative B, except that Alternative D opens the Sweetwater River Pasture of the Silver Creek Allotment to grazing. This would beneficially impact livestock grazing by maintaining 1,074 permitted AUMs. On a planning area basis, this would be a minor adverse impact. Both alternatives B and D trend less away from the primitive setting toward a more urban setting, and therefore would result in more beneficial impacts to livestock grazing than Alternative C.

4.6.5.3.5.4. Special Designations

Alternative D would result in fewer adverse impacts to livestock grazing from special designation management than Alternative B, but more than Alternative C. Alternative D designates 245,037 acres as ACECs. Alternative D closes 6,313 acres to livestock grazing (these are the same closures discussed above, not duplicative), which would result in, on a planning area-wide basis, inconsequentially more adverse impacts to livestock grazing than alternatives A and C. For wildlife ACECs, such as Lander Slope and Red Canyon, Alternative D authorizes new range improvement projects if the purpose is to enhance the values in the ACEC. These projects also could result in beneficial impacts to livestock grazing, but would require site-specific analysis to determine impacts. In other ACECs, range improvement projects would be authorized on a case-by-case basis, as under Alternative A. In this regard, Alternative D would result in more adverse impacts than Alternative C, which does not manage any areas for ACEC values and would allow range improvement projects regardless of benefits to other resource values.

Alternative D would result in fewer adverse impacts to livestock grazing than Alternative B because range improvement projects within ½ mile of RHT&EHs are authorized if they meet VRM objectives and are not otherwise limited. This management would result in the same minor adverse impacts to livestock grazing as alternatives A and C (which, although Alternative C, like alternatives A and D, does not designate the RHT&EH as ACECs, must still meet NHPA requirements).

Alternative D management of Congressionally Designated Trails would result in substantially more adverse impacts to livestock grazing than Alternative C. Alternative D manages a much larger area around trails with VRM objectives, which could result in adverse impacts to livestock grazing through the location of range improvement projects and the closing of trail corridors to ROWs (except in identified locations). However, these adverse impacts would be somewhat offset by beneficial impacts to grazing through limitations on surface disturbance in trail corridors to meet VRM objectives. Management actions that limit surface disturbance would indirectly benefit livestock grazing by improving vegetation and preventing the spread of INNS.

Alternative D would also adversely impact the construction of range improvements along eligible and recommended suitable WSRs, which would be considered on a case-by-case basis, depending on whether they would enhance the outstanding values of the waterways. Therefore, Alternative D would result in impacts to livestock grazing from WSR-related management similar to alternatives A and B.

4.6.6. Recreation

The following impact definitions (characterizations) apply to this analysis:

- Impacts to the recreation setting of important recreation areas that result from resource and resource use management actions constitutes a direct adverse impact to recreation.
- Closing areas to a specific recreation activity has a direct adverse impact on the specific activity that is precluded.
- Closing areas to motorized vehicles and precluding energy development will cause areas to trend toward a primitive recreation setting. In general, settings that trend toward primitive have a beneficial impact to nonmotorized recreation and adverse impact to motorized recreation. Primitive settings typically have a high degree of naturalness, with few human disturbances on the landscape. The acres of recreation setting trending toward primitive was calculated based upon the amount of area precluded from energy development and closed to motorized vehicle use.
- Areas precluded from energy development but not closed to motorized vehicles will demonstrate a recreation setting that is unchanged or maintained at existing condition. These areas would continue to benefit the diversity of recreation opportunities that currently exist across the planning area. The acres of recreation setting maintained at existing conditions is equal to the area precluded from energy development.
- Areas with high and moderate potential for energy and mineral resources (and not precluded from development) would experience increased development, causing the recreation setting in the area to trend toward urban/industrial. This trend would adversely impact most recreationists, with the exception of those who specifically enjoy motorized recreation in a modified environment. The acres of recreation setting trending toward urban/industrial was calculated based on an overlay of those areas not precluded from development with high and moderate potential for the various energy resource.
- Managing areas as SRMAs can have a direct beneficial impact to: individuals, communities, economies, and/or the environment. These beneficial impacts are assigned within the management objectives of SRMAs.
- Management actions that benefit wildlife and wildlife habitat would benefit recreation. In addition, actions that restrict habitat losses and adverse changes in recreation setting in WGFD hunt units managed for special criteria would benefit recreation. The acres of area enhanced for wildlife dependent recreation is calculated based upon an additive of the areas precluded from development and the acres of area where wildlife dependent recreation is specifically targeted within a recreation management objective. The percent of WGFD special hunt units maintained to facilitate trophy/high quality hunting opportunities was calculated by

dividing the amount of special hunt units precluded from energy development by the total area of special hunt units.

- Management actions to support resources that limits energy development would limit changes to the area, thus indirectly benefitting recreation settings.

This section focuses on analyzing impacts to recreation management outside Congressionally Designated Trails. See the *Congressionally Designated Trails – Recreation and Visual Resources* section for impacts to recreationists and the recreational setting along Congressionally Designated Trails.

4.6.6.1. Summary of Impacts

Table 4.33, "Impacts to Recreation Setting by Alternative" (p. 1020) summarizes impacts to the recreation environment (setting) across alternatives. Recreation management under the alternatives reflects the diversity of visitor demand in the planning area. Recreation management also reflects the fact that accommodating specific visitor demand is contingent on restrictions in other BLM management programs (e.g., energy development). Therefore, the range of management actions in the recreation program heavily influences the level of impact to recreationists and the recreation setting under each alternative. For these reasons, Table 4.33, "Impacts to Recreation Setting by Alternative" (p. 1020) summarizes both the impacts of program management and impacts to the overall recreation setting.

Table 4.33. Impacts to Recreation Setting by Alternative

Anticipated Recreation Setting Trend	Alternative A	Alternative B	Alternative C	Alternative D
Acres of recreation setting trending toward primitive	5,923	71,761	5,472	25,425
Acres of recreation setting maintained at existing conditions	146,717	1,739,972	16,330	714,824
Acres of recreation setting trending toward urban/industrialized at an increased scale and pace	2,241,570	582,477	2,372,408	1,653,961
Source: BLM 2009a				

Visitors also express very diverse preferences for recreation activities. The general recreation groupings in this analysis are consumptive, non-consumptive, motorized, and nonmotorized. Some management actions under alternatives could restrict opportunities to participate in these recreational activities. Closures to activities adversely impact recreationists who participate in those activities. However, closures to one activity could benefit other recreationists when the area is closed to a conflicting activity. Table 4.34, "Acreage Available to Consumptive, Non-consumptive, Motorized, and Nonmotorized Recreation Activities" (p. 1021) displays the acreage in the planning area open or closed to consumptive, non-consumptive, motorized, and nonmotorized recreation activities.

Table 4.34. Acreage Available to Consumptive, Non-consumptive, Motorized, and Nonmotorized Recreation Activities

Activities	Alternative A (acres)		Alternative B (acres)		Alternative C (acres)		Alternative D (acres)	
	Open	Closed	Open	Closed	Open	Closed	Open	Closed
Consumptive	Entire planning area	0	Entire planning area	0	Entire planning area	0	Entire planning area	0
Non-consumptive	Entire planning area	0	Entire planning area	0	Entire planning area	0	Entire planning area	0
Motorized	2,388,287	5,923	2,322,449	71,761	2,388,738	5,472	2,368,785	25,425
Nonmotorized	Entire planning area	0	Entire planning area	63,379 (closed to mechanized only)	Entire planning area	0	Entire planning area	0
Source: BLM 2009a								

Accommodating visitor demand for beneficial outcomes is limited and affected by the actions or restrictions in other BLM management programs. For example, accommodating visitor demand for specific recreation benefits would be almost impossible in an area targeted for heavy energy development. Conversely, management objectives for SRMAs specifically target beneficial outcomes resulting from recreation use. Table 4.35, "Recreation-Specific Beneficial Outcomes by Alternative" (p. 1021) lists the acres of recreation-specific beneficial outcomes and the recreation sectors that would benefit.

Table 4.35. Recreation-Specific Beneficial Outcomes by Alternative

Recreation Area (Priority Activities)	Beneficial Outcomes to:	Acres by Alternative Managed for Beneficial Outcomes			
		Alternative A	Alternative B	Alternative C	Alternative D
Johnny Behind the Rocks (Horseback Riding, Mountain Biking, Hiking, Trail Running, Wildlife Viewing)	Local Individuals, Lander Community, and the Environment	0	5,594	0	3,897
Sinks Canyon Climbing Area (Climbing, Hiking)	Local Individuals, Lander Community, and the Environment	0	139	0	Same as Alternative B
Bus @ Baldwin Creek (Horseback Riding, Trail Running, Mountain Biking, Hiking)	Local Individuals, Lander Community, and the Environment	0	1,159	0	Same as Alternative B
Dubois Mill-Site (Hiking, Walking, Running, Wildlife Viewing, Horseback Riding, (Motorized Trail Riding Alternative C Only)	Individuals, Dubois Community, (Environment Alternative B Only)	0	608	608	Same as Alternative B
Sweetwater Canyon (Hiking, Backpacking, Horseback Riding, Hunting, Fishing, Wildlife Viewing)	Individuals, Environments, and Regional Economics	0	9,136	0	Same as Alternative B

Recreation Area (Priority Activities)	Beneficial Outcomes to:	Acres by Alternative Managed for Beneficial Outcomes			
		Alternative A	Alternative B	Alternative C	Alternative D
Sweetwater Rocks (Climbing, Hiking, Backpacking, Horseback Riding, Hunting, Wildlife Viewing)	Individuals, Environments, and Regional Economics	0	49,727	0	41,806
Source: BLM 2009a					

During workshops, cooperators identified the need to accommodate hunting heritage and conserve wildlife. To that end, cooperators identified objectives, several of which also provide indicators to analyze alternatives. Acres where wildlife-dependent recreation is enhanced and acres where the BLM can facilitate trophy/high-quality hunting opportunities in WGFD hunt units managed under special management criteria not only reflects direct impacts but also recognizes the causal link between wildlife, associated habitat, and recreation. Table 4.36, “Wildlife-Dependent Recreation Acreage by Alternative” (p. 1022) lists the acres of area where management actions would enhance wildlife-dependent recreation, and the percent of WGFD special hunt units where management actions would limit habitat losses and changes to the recreation setting.

Table 4.36. Wildlife-Dependent Recreation Acreage by Alternative

Wildlife Dependent Recreation	Alternative A	Alternative B	Alternative C	Alternative D
Acres of area enhanced for wildlife dependent recreation	146,717	1,890,599	16,330	1,312,086
Percent of Wyoming Game and Fish Department special hunt units maintained to facilitate trophy/high quality hunting opportunities	Antelope: 11% Mule Deer: 4%	Antelope: 94% Mule Deer: 86%	Antelope: 8% Mule Deer: 4%	Antelope: 46% Mule Deer: 20%
Source: BLM 2009a				

4.6.6.2. Methods and Assumptions

This analysis focuses on the indicators (recreation setting, activities, beneficial outcomes, and wildlife-dependent recreation) described above. In addition, the analysis compares impacts to the following important (as identified by visitor demand) recreation areas under the alternatives: Agate Flats, Beaver Creek Nordic Ski Area, Muskrat Basin, Dubois Mill Site, Johnny Behind the Rocks, Sinks Canyon, the Bus @ Baldwin Creek, Sweetwater Canyon, Sweetwater Rocks, Castle Gardens, Copper Mountain WSA, Dubois Badlands WSA, Coalmine/Government Draw, Green Mountain, Lander Slope/Red Canyon, and Whiskey Mountain/Eastfork.

Methods and assumptions used in this impact analysis include the following:

- Visitors have specific preferences for recreation settings. The recreation setting is an integral supply component of the recreation environment because settings “not only affect the experiences and benefits,” but also help to “define what type of activities might occur in an area” (Pierskalla et al. 2004).
- Beneficial outcomes realized by recreationists and communities will occur across the planning area as specified in the outcome objectives for each alternative. While outcomes could be realized anywhere in the planning area, specifically targeted outcomes will be realized at a much higher rate because the BLM and its partners will actively develop management actions and provide a recreation setting that facilitates these outcomes (Driver 2008). In addition,

allowable use decisions will sustain and enhance recreation outcomes throughout the planning period (Hopkins 2008).

- All areas (SRMAs and ERMAs) will be managed to meet statutory requirements to ensure resource protection, human health and safety, reduce conflicts, and achieve other program planning objectives.
- Limiting the amount of group use, limiting destructive activities, influencing behaviors, concentrating use, utilizing or creating hardened sites, and shielding areas from use reduces environmental impacts from recreation (Cole 1993). These options will be considered the primary management actions available to alleviate impacts to resources from recreation.
- Sanderson et al. (Sanderson et al. 1986) found that, as livestock management intensities (including level of fencing or other range improvements) increased, visitor demand or enticement for an area decreased.
- Sanderson, et al. (Sanderson et al. 1986) found that customer or visitor preference for a landscape decreased as grazing intensity increased.
- Visitor experience-inhibiting encounters with livestock include cows near camps, manure on trails, and cows or impacts near water sources (Wallace et al. 1996).
- The most important characteristics for determining the impacts to the environment from recreation are (1) the amount of use, (2) the type of recreation activity, (3) the behavior of recreationists, (4) the spatial distribution of use, and (5) the temporal distribution of use (Cole 1993).
- Allowable use decisions that protect wildlife habitat would also benefit wildlife-dependent recreation. In addition, areas specifically identified for management to enhance wildlife-dependent recreation would benefit this management.

4.6.6.3. Detailed Analysis of Alternatives

4.6.6.3.1. Impacts Common to All Alternatives

Recreation management decisions will limit some recreation activities. Specifically, the 14-day campsite occupancy limit would impact recreationists who desire to camp for longer periods. This demand is especially high during the fall hunting season that runs approximately 60 to 80 days, depending on the species pursued and weapon choice. This impact would occur across the planning area and during any season recreationists desire to camp for more than 14 days.

Recreation management will increase access and provide additional hunting opportunities for handicapped individuals. These decisions would enhance wildlife-dependent recreation for all participants.

Several resource management actions common to all alternatives would impact recreation settings and activities. First, standard wildlife and special status species stipulations (such as seasonal limitations on surface-disturbing and surface-disruptive activities) would limit recreation activities and/or recreation permit holders. These impacts would be seasonal and not result in permanent closures. Second, activities to gather wild horses would continue to temporarily introduce undesirable amounts of noise and activity to the recreation setting. Wild horse roundup activities also displace wildlife; therefore, these impacts would especially affect wildlife-dependent recreation if roundup activities are performed during fall hunting seasons. Finally, standard cultural resources stipulations (resource protection actions) would continue to limit new recreation developments and visitor services. These stipulations rarely preclude projects, but could result in project relocation or modification. Impacts to recreation settings and activities from management under other resource programs would be seasonal and occur randomly, locally, and in relatively small portions of the planning area.

Resource use management actions common to all alternatives would impact recreation settings and activities. Areas identified as having high and moderate potential for oil and gas would continue to demonstrate trends toward urban/industrial recreation settings. In addition, development of these areas would continue to reduce opportunities for wildlife-dependent recreation because habitats and recreation settings would be altered. Several travel management decisions common to all alternatives would restrict the use of motorized and over-snow vehicles. In particular, cross-country motorized vehicle use would be limited to 300 feet to retrieve harvested big game animals. This and other limitations would adversely impact motorized vehicle users, but would beneficially impact nonmotorized recreationists. Continuing to authorize the current amounts, kinds, and season of livestock grazing use would continue to impact recreationists and important recreation areas. Visitor encounters with livestock such as cows near camps, manure on trails, and cows or impacts near water sources would affect visitor experiences (Wallace et al. 1996). In addition, areas with high-intensity grazing or that trend toward increasing grazing intensity would experience a decrease in visitor preference (Sanderson et al. 1986). Impacts to recreation from resource use programs would occur year-round and across the planning area. The intensity of impacts from oil and gas development and livestock grazing would depend on the intensity of use resulting from these programs.

Several resource management actions common to all alternatives would enhance recreation activities, recreation settings, and wildlife dependent recreation. Several management actions related to wildlife and special status species would promote healthy wildlife populations and habitats, and mitigate impacts to wildlife from authorized activities. In addition, the biological resources management actions include: reintroduction of native species on a case-by-case basis. These actions would enhance wildlife-dependent recreation opportunities by simply promoting more wildlife. Ensuring VRM Class I and II objectives are met through allowable use decisions would beneficially impact recreationists who enjoy scenic environments. These beneficial impacts would occur across the planning area, but primarily in identified winter ranges protected under seasonal stipulations, when reintroduction of native species (such as bighorn sheep) actually occurs, and/or in areas identified as Class I and II.

Continued management of WSAs under the IMP would enhance primitive and nonmotorized recreation opportunities. These areas also would enhance nonmotorized wildlife-dependent recreation opportunities by protecting wildlife and habitats.

4.6.6.3.2. Alternative A

4.6.6.3.2.1. Program Management

Visitor services under Alternative A will be a function of actions to protect resources, mitigate use and user conflicts, and protect human health and safety. That is, visitor services under this alternative will focus on accommodating the priorities of other BLM programs rather than accommodating visitor demand. This would adversely impact recreationists because it is not responsive to visitor demands for recreation settings, activities, and/or outcomes.

Program management under Alternative A protects several existing developed recreation sites, but does not include any allowable use decisions to protect important recreation areas. Protections under this alternative would maintain existing investments, but does not include decisions that would allow for future development of new recreation sites or maintenance and enhancement of important recreation areas. Program management under this alternative would not sustain or enhance the recreation settings of important recreation areas to supply specific visitor demand for recreational opportunities (activities and outcomes).

4.6.6.3.2.2. Resources

Alternative A closes 5,923 acres to motorized vehicles year-round to protect resources. The year-round closures would result in 5,923 acres trending toward primitive. This trend would reduce opportunities for motorized recreation activities and enhance nonmotorized activities. In addition, without allowable use decisions to sustain or enhance recreation opportunities, stipulations on resources (e.g., wildlife and cultural resources) could conflict with recreation settings and opportunities in important recreation areas. This conflict would be random and local; therefore, it is not possible to predict the scale and locations of the impacts.

Development associated with resource uses increases road densities, decreases naturalness, and increases contacts with other humans (setting trending toward urban/industrial). Overall, allowable use decisions to protect resources (e.g., wildlife) would limit development associated with resource uses. Therefore, most allowable use decisions associated with resources would result in the maintenance of recreation settings, a beneficial impact to recreation management.

The maintenance of existing recreation settings as a result of allowable use decisions to protect resources would facilitate a diversity of recreation opportunities. In addition, allowable use decisions to protect resources would reduce the potential for setting change in important recreation areas, and resource use decisions to protect wildlife and wildlife habitat would enhance and maintain opportunities for wildlife-dependent recreation. As a result of allowable use decisions associated with wildlife, cultural resources, and visual resources, 146,717 acres of recreation setting across the planning area would be maintained. Development in the following important recreation areas is precluded or restricted under Alternative A: Castle Gardens, Coalmine/Government Draw, Dubois Badlands WSA, Dubois Mill Site, Sinks Canyon Climbing Area, the Bus @ Baldwin Creek, and Whiskey Mountain/Eastfork. Finally, allowable use decisions associated with resources would maintain or enhance wildlife-dependent recreation on 146,717 acres, and 7 percent of WGFD special hunt units would be maintained/enhanced to facilitate trophy/high-quality hunting opportunities.

4.6.6.3.2.3. Resource Uses

Because of authorized uses associated with mineral and energy resources, Alternative A would result in 2,241,570 acres of recreation setting trending toward urban/industrial. This would adversely impact recreationists seeking to recreate in areas with low road density, high degree of naturalness, and few people. Conversely, these impacts would benefit recreationists who enjoy recreating in a motorized/high road density environment with numerous human disturbances and other users.

Under Alternative A, authorized uses associated with mineral and energy resources would impact several important recreation areas in the planning area (see Table 4.37, "Energy-Related Impacts to Recreation Areas under Alternative A" (p. 1026)).

Table 4.37. Energy-Related Impacts to Recreation Areas under Alternative A

Important Recreation Area	Impacts
Agate Flats	Wildcat exploration and small-scale development in support of oil and gas extraction will continue primarily in the western (near Beaver Rim/Tin Cup Mountain) portion of the area. Wind-energy development would occur throughout the landscape. Several ROWs would continue to show disturbance across the landscape. These activities would result in the Agate Flats area demonstrating an overall trend toward urban/industrial setting. In addition, these activities would impact wildlife-dependent recreation and the WGFD Antelope hunt areas in the area.
Copper Mountain WSA	Wind-energy development outside the WSA would dominate the view of recreationists participating in activities in the WSA. Such development would be in view from numerous locations in the WSA.
Green Mountain	Alternative A impacts to Green Mountain would occur outside the existing ACEC designated to protect elk parturition and winter ranges. Wildcat exploration and small-scale development in support of oil and gas extraction would continue in the northern and southern portions of this area. Wind-energy development would occur across the entire area. Extensive uranium development also could occur across most of the area. These activities would result in the Green Mountain area demonstrating a major trend in setting change toward urban/industrial. These actions also would reduce wildlife-dependent recreation opportunities, reduce wildlife habitats, and alter recreation settings in several WGFD Antelope hunt areas managed under special criteria.
Johnny Behind The Rocks	Wildcat exploration and small-scale development in support of oil and gas extraction would continue throughout the area. Alternative A management of this important recreation area focuses on the sole purpose of extracting bentonite. Bentonite exploration requires complete stripping of vegetation and removal of multiple feet of soil on slopes and ridge tops in the area. A bentonite mine in the Johnny Behind The Rocks area would preclude recreation in the area.
Lander Slope/Red Canyon	Alternative A management of the Lander Slope focuses on the sole purpose of extracting phosphate. Phosphate exploration requires complete stripping of vegetation and removal of multiple feet of soil on slopes and ridge tops in the area. A phosphate mine on the Lander Slope would preclude recreation in the area.
Muskrat Basin	Wildcat exploration and small-scale development in support of oil and gas extraction would continue throughout the area. Wind-energy development would occur on top of Beaver Rim and several prominent ridges (such as Signor Ridge). In addition, phosphate mining could occur in an isolated portion of this area. These activities would result in the Muskrat Basin area demonstrating a trend toward urban/industrial setting. These actions also would reduce wildlife-dependent recreation opportunities, reduce wildlife habitats, and alter recreation settings in several WGFD Antelope hunt areas and a mule deer hunt area managed under special criteria.
Sweetwater Canyon	Wind-energy development outside the WSA would dominate the view of recreationists participating in activities in the WSA. Such development would be in view from numerous locations in the WSA.
Sweetwater Rocks	Wind-energy development and granite mining outside the WSA would dominate the view of recreationists participating in activities in the WSA. Such development would be in view from numerous locations in the WSA.

ACEC Area of Critical Environmental Concern
ROW right-of-way
WGFD Wyoming Game and Fish Department
WSA Wilderness Study Area

Most of the planning area is open to ROW authorizations under this alternative. Impacts from these actions would be random and differ in scale. Locating ROWs in existing disturbed areas would not alter the recreation setting. New disturbances associated with ROWs under this alternative would result in recreation settings trending toward urban/industrial. Important recreation settings precluded from most ROW development include Sweetwater Rocks, Lander Slope/Red Canyon, and the Dubois Millsite.

Alternative A allows for continued development of range projects and existing levels of livestock grazing intensities, which in some areas is heavy (greater than 60 percent). Areas with new range projects would see a decrease in visitor preference, visitors would continue to show reduced preference toward areas with existing range improvements, and areas demonstrating high levels of utilization would not be favored by recreationists (Sanderson et al. 1986). Visitor encounters with livestock such as cows near camps, manure on trails, and cows or impacts near water sources (Wallace et al. 1996) would continue across the planning area and in all important recreation areas including Sweetwater Canyon. This would inhibit visitor experiences.

4.6.6.3.2.4. Special Designations

Because ACEC designations are a function of protecting relevant and important resources, impacts to recreation from the designation of ACECs are captured above. Secondary impacts to recreation from management of these special designations (e.g., trail viewshed protections that also limit development in important recreation areas) is also described above. See the *Congressionally Designated Trails – Recreation and Visual Resources* section for impacts to recreation from the management of Congressionally Designated Trails and the *Wild and Scenic Rivers* section for impacts to recreation from the management of WSRs.

4.6.6.3.3. Alternative B

4.6.6.3.3.1. Program Management

Alternative B closes 7,500 acres to motorized activities to meet specific customer demand in the Johnny Behind the Rocks, the Bus @ Baldwin Creek, and the Dubois Mill Site areas. In addition, this alternative closes 18,251 acres in important wildlife-dependent recreation areas (Green Mountain and Red Canyon) to ensure a diversity of wildlife-dependent recreation opportunities. The year-round closures would result in 15,751 acres trending toward primitive setting as a direct result of actions to enhance nonmotorized recreation. This trend would reduce opportunities for motorized recreation activities and enhance opportunities nonmotorized activities.

Program management under this alternative is responsive to customer demand. Compared to Alternative A, Alternative B increases visitor services in all important recreation areas and provides allowable use decisions that ensure the future recreational enjoyment of these areas.

Alternative B manages seven important recreation areas (totaling 307,183 acres) as SRMAs. In SRMAs, the recreation setting is managed to meet visitor demand for specific activities, experiences, and benefits. Under Alternative B, allowable uses (limits on other BLM programs) and management actions are specifically developed to sustain and/or enhance the entire recreation setting. The following important recreation areas will be in SRMAs to meet specific visitor demand: Dubois Mill Site, Johnny Behind the Rocks, Sinks Canyon, Sweetwater Canyon, and the Sweetwater Rocks.

Alternative B also manages several important recreation areas (not in SRMAs) in a manner that meets a less specific/more diverse visitor demand in concert with wildlife program objectives. Alternative B manages these areas as distinct ERMAs. Distinct ERMAs are areas where management focuses on providing a diversity of recreation opportunities, within the confines of both recreation and non-recreation program objectives. In distinct ERMAs, allowable uses and management actions address recreation and tourism issues, activities, and conflicts and/or single important attributes (such as remoteness) of the area. Compared to Alternative A, the Alternative B focus on harmonizing visitor services, diversifying recreation opportunities, and other program priorities constitutes an increased level of visitor services. Alternative B manages the remainder of important recreation areas as distinct ERMAs, including Agate Flats, Beaver Creek Nordic Ski Area, Castle Gardens, Coalmine/Government Draw, Copper Mountain WSA, and Dubois Badlands WSA,

Program management in Alternative B would protect more existing developed recreation sites than Alternative A. In addition, the alternative would protect future developed sites and investments. Alternative B would apply allowable use decisions to protect more important recreation areas than Alternative A.

Program management under Alternative B also identifies several actions to enhance wildlife-dependent recreation, including:

1. Specifically identifying the Agate Flats, Green Mountain, Lander Slope/Red Canyon, and Muskrat Basin distinct ERMAs for wildlife-dependent recreation,
2. Increasing visitor services in these distinct ERMAs to facilitate wildlife-dependent recreation,
3. Identifying seasonal restrictions in the Agate Flats and Muskrat Basin areas so as not to authorize surface-disturbing activities during the hunting season of several WGFD hunt areas managed under special criteria,
4. Managing the Dubois Mill Site, Johnny Behind the Rocks, Sweetwater Canyon, and Sweetwater Rocks SRMAs to enhance specific recreation opportunities, including wildlife-dependent recreation, and
5. Applying allowable use decisions in the above SRMAs to sustain/enhance the recreation setting to provide specific recreation opportunities associated with wildlife-dependent recreation.

4.6.6.3.3.2. Resources

Alternative B closes 71,761 acres to motorized vehicles year-round to protect resources. The year-round closures would result in 71,761 acres trending toward primitive setting. This trend would reduce opportunities for motorized recreation activities and enhance nonmotorized activities. Stipulations for resources (e.g., wildlife and cultural resources) could conflict with recreation settings and opportunities in important recreation areas. Conflict would be local and random, and occur at a lower rate than Alternative A.

Allowable use decisions to protect resources (e.g., wildlife) would limit development associated with resource uses, such as increased road densities, decreased naturalness, and increased contacts with other humans (settings trending toward urban/industrial). Therefore, most allowable use decisions associated with resources would result in the maintenance of recreation settings.

The maintenance of existing recreation settings as a result of allowable use decisions to protect resources would continue to facilitate a diversity of recreation opportunities. In addition, allowable use decisions to protect resources would reduce the potential for setting changes in important recreation areas, and resource use decisions to protect wildlife and wildlife habitat would enhance and maintain opportunities for wildlife-dependent recreation. As a result of allowable use decisions associated with wildlife, cultural resources, and visual resources, 1,739,972 acres of recreation setting across the planning area would be maintained. Alternative B precludes or restricts development in all important recreation areas. Finally, allowable use decisions associated with resources would maintain or enhance wildlife-dependent recreation on 1,890,599 acres, and 90 percent of WGFD special hunt units would be maintained and enhanced to facilitate trophy and high-quality hunting opportunities.

4.6.6.3.3.3. Resource Uses

Because of authorized uses associated with mineral and energy resources, Alternative B would result in 582,477 acres of recreation setting trending toward urban/industrial. This would adversely impact recreationists who seek to recreate in areas with low road densities, high levels of naturalness, and few people. Conversely, these impacts would beneficially impact recreationists who enjoy recreating in a motorized/high road density environment with numerous human disturbances and other users. All of these impacts would be outside important recreation areas, because Alternative B closes important recreation areas to mineral and energy development.

Alternative B opens most of the planning area to ROW authorizations and land actions. Impacts from these actions would be random and differ in scales. Locating ROWs in existing disturbed areas would not alter the recreation setting. New disturbances associated with ROWs under this alternative would result in recreation settings trending toward urban/industrial. This alternative precludes all important recreation areas from most ROW development.

Alternative B closes the entire planning area to new range improvement projects that conflict with other values. This would result in a decrease in the intensity and occurrence of range improvements from Alternative A. Compared to Alternative A, this would increase visitor demand and enticement across the planning area.

In addition, Alternative B manages for light grazing intensity across the planning area, which would increase visitor preference for the area. Visitor experience inhibiting encounters with livestock such as cows near camp, manure on the trail, and cows or impacts near water sources would occur at a lower rate than under Alternative A across the planning area. Alternative B closes Sweetwater Canyon, the Dubois Millsite, and portions of the Whiskey Mountain/Eastfork area to livestock grazing, which would remove any potential for visitor encounters with livestock.

4.6.6.3.3.4. Special Designations

Because ACEC designations are a function of protecting relevant and important resources, impacts to recreation from the designation of ACECs are captured above. Secondary impacts to recreation from management of these special designations (e.g., trail viewshed protections that also limit development in important recreation areas) are also described above. See the *Congressionally Designated Trails – Recreation and Visual Resources* section for impacts to recreation from the management of Congressionally Designated Trails and the *Wild and Scenic Rivers* section for impacts to recreation from the management of WSRs.

4.6.6.3.4. Alternative C

4.6.6.3.4.1. Program Management

Alternative C program management is not responsive to visitor demands for recreation settings, activities, and/or outcomes in most of the important recreation areas. Visitor services under this alternative will be a function of actions to protect resources, mitigate use and user conflicts, and protect human health and safety. That is, visitor services under this alternative will focus on accommodating priorities of other BLM programs rather than accommodating visitor demand. This alternative also relocates or removes developed recreation sites or trails to accommodate mineral and energy development activities.

Program management under Alternative C does not provide protections for several existing developed recreation sites, and does not include any allowable use decisions to protect important recreation areas. Protections under this alternative would not maintain existing investments, and would not facilitate future development of new recreation sites or maintenance and enhancement of important recreation areas.

Program management under this alternative would not sustain or enhance the recreation settings of most of the important recreation areas, but focuses instead on mitigating adverse impacts from other resource uses. This would result in several instances where visitor services are removed or relocated to less than desirable locations to accommodate resource uses.

Alternative C manages the Dubois Mill Site (608 acres) as a SRMA. In SRMAs, the recreation setting is managed to meet visitor demand for specific activities, experiences, and benefits. Within these important areas, allowable uses (limits on other BLM programs) and management actions are specifically developed to sustain and/or enhance the entire recreation setting. This alternative does not identify any allowable use decisions for the Dubois Millsite. Therefore substantial visitor service efforts would be initiated to mitigate impacts from other resource uses.

4.6.6.3.4.2. Resources

Alternative C does not close areas or limit motorized travel seasonally. As a result, no settings in the planning area would trend toward primitive. Compared to Alternative A, this would result in fewer opportunities for nonmotorized recreation activities and provide more acreage for motorized activities. In addition, without allowable use decisions to sustain or enhance recreation opportunities, standard stipulations on resources (e.g., wildlife and cultural resources) could conflict with recreation settings and opportunities in important recreation areas. These conflicts would be local and random; therefore, it is not possible to predict the scale and locations of the impacts.

Alternative C does not include ACECs and limits resource protections to standard management. Therefore, stipulations associated with resource protections would result in minor benefits to recreation and would protect fewer acres than Alternative A. Development associated with resource uses includes increased road densities, decreased naturalness, and increased contacts with other humans (settings trending toward urban/industrial).

As a result of allowable use decisions associated with wildlife, cultural resources, and visual resources, 16,330 acres of recreation setting across the planning area would be maintained. Alternative C resource decisions would not preclude development in any of the important recreation areas. Four of the important recreation areas without future development potential might not show much change from Alternative A, which includes Beaver Creek Nordic Ski Area, Castle Gardens, Coalmine/Government Draw, and Sinks Canyon. Finally, allowable use decisions associated with resources would maintain or enhance wildlife-dependent recreation on 16,330 acres and 6 percent of WGFD special hunt units would be maintained/enhanced to facilitate trophy/high-quality hunting opportunities.

4.6.6.3.4.3. Resource Uses

Because of authorized uses associated with mineral and energy resources, this alternative would result in 2,372,408 acres of recreation setting trending toward urban/industrial. This would adversely impact recreationists who seek to recreate in areas with low road densities, high levels of naturalness, and few people. Conversely, these impacts would beneficially impact recreationists who enjoy recreating in a motorized/high road density environment with numerous human disturbances and other users.

Under Alternative C, authorized uses associated with mineral and energy resources would impact 12 of the 16 important recreation areas (see Table 4.38, "Energy-Related Impacts to Recreation Areas under Alternative C" (p. 1031)).

Table 4.38. Energy-Related Impacts to Recreation Areas under Alternative C

Important Recreation Area	Impacts
Agate Flats	Increased levels of wildcat exploration and small-scale development in support of oil and gas extraction would impact the western (near Beaver Rim/Tin Cup Mountain) portion of the area. Wind-energy development would occur throughout the landscape. Several ROWs would continue to show disturbance across the landscape. These activities would occur at a higher rate under Alternative C than under Alternative A and result in the Agate Flats area demonstrating an overall setting trend toward urban/industrial. In addition, these activities would impact wildlife-dependent recreation and the WGFD Antelope hunt areas in the area.
Copper Mountain WSA	Wind-energy development outside the WSA would dominate the view of recreationists participating in activities in the WSA. Such development would be in view from numerous locations in the WSA at an increased rate over Alternative A.
Dubois Badlands WSA	Wind-energy development outside the WSA would dominate the view of recreationists participating in activities in the WSA. Such development would be in view from numerous locations in the WSA at an increased rate over Alternative A.
Dubois Mill Site	Increased wildcat exploration and small-scale development in support of oil and gas extraction would occur across the area. Wind-energy development adjacent to the area would dominate the view of recreationists participating in activities in the WSA. Such development would be in view from numerous locations in the WSA at an increased rate over Alternative A.
Green Mountain	Impacts to Green Mountain under Alternative C would occur across the entire mountain because this alternative does not include an ACEC in this area. Increased wildcat exploration and small-scale development in support of oil and gas extraction would occur across the area. Wind-energy development would occur across the entire area. Extensive uranium development could also occur across most of the area. These activities would result in the Green Mountain area demonstrating a major change in setting trending toward urban/industrial. This trend would occur across more of the landscape then under Alternative A. These actions also would reduce wildlife-dependent recreation opportunities, reduce wildlife habitats, and alter recreation settings in several WGFD Antelope hunt areas managed under special criteria.
Johnny Behind The Rocks	Impacts to this area would be similar to those under Alternative A, with more areas available for wildcat exploration and small-scale development in support of oil and gas extraction throughout the area. Management of this important recreation area under Alternative C focuses on the sole purpose of extracting bentonite. Bentonite exploration requires complete stripping of vegetation and removal of multiple feet of soil on slopes and ridge tops in the area. A bentonite mine in the Johnny Behind The Rocks area would preclude recreation in the area.

Important Recreation Area	Impacts
Lander Slope/Red Canyon	Alternative C management of the Lander Slope/Red Canyon area focuses on the sole purpose of extracting phosphate. The potential for impacts to recreation from phosphate development would be much higher under Alternative C than under Alternative A because Alternative C does not include ACEC protections for the area. Phosphate exploration requires complete stripping of vegetation and removal of multiple feet of soil on slopes and ridge tops in the area. A phosphate mine on the lander slope would preclude recreation use in the area.
Muskrat Basin	Wildcat exploration and small-scale development in support of oil and gas extraction would continue throughout the area at a higher rate than under Alternative A. Wind-energy development would occur at a higher rate than under Alternative A. In addition, phosphate mining could occur in an isolated portion of this area. These activities would result in the Muskrat Basin area demonstrating a major change in setting trending toward urban/industrial. These actions also would reduce wildlife-dependent recreation opportunities, reduce wildlife habitats, and alter recreation settings in several WGFD Antelope hunt areas and a mule deer hunt area managed under special criteria.
Sweetwater Canyon	Wind-energy development outside the WSA would dominate the view of recreationists participating in activities in the WSA. Such development would be in view from numerous locations in the WSA and at an increased level over Alternative A.
Sweetwater Rocks	Wind development and granite mining outside of the WSA would dominate the view of recreationists participating in activities within the WSA. Such development would be in view from numerous locations within the WSA.
Bus @ Baldwin Creek	Without the Lander Slope ACEC encompassing this area, the probability of change to this landscape from energy and mineral development would be higher under Alternative C than under Alternative A.
Whiskey Mountain/Eastfork	Without the ACECs encompassing this area, wind-energy development would be likely. Wind-energy development in the area would alter the naturalness of the landscape.
ACEC Area of Critical Environmental Concern ROW right-of-way WGFD Wyoming Game and Fish Department WSA Wilderness Study Area	

Alternative C opens most of the planning area to ROWs and land actions. Impacts from these actions would be random and differ in scale. Locating ROWs in existing disturbed areas would not alter the recreation setting. New disturbances associated with ROWs under this alternative would result in recreation settings trending toward urban/industrial. Designated corridors under this alternative would impact the following important recreation areas: Green Mountain, Agate Flats, Muskrat Basin, Lander Slope/Red Canyon, and Sweetwater Rocks. Alternative C does not preclude any important recreation areas from ROW development.

Compared to Alternative A, Alternative C would result in increased development of range improvement projects to support livestock grazing therefore visitor demand or enticement for these areas would decrease. In addition, areas with high intensity grazing or an increasing trend toward higher intensity grazing use would show a decrease in visitor preference. Alternative C provides for grazing intensity that would continue to decrease visitor preference for numerous areas across the planning area. Visitor encounters with livestock such as cows near camps, manure on trails, and cows or impacts near water sources would continue across the planning area and in all important recreation areas, including Sweetwater Canyon. This would inhibit visitor experiences.

4.6.6.3.4.4. Special Designations

Alternative C does not include ACECs. The impacts to recreation associated with excluding ACECs is captured above. Additionally, impacts to recreation from the management of Congressionally Designated Trails and WSRs are discussed in the *Congressionally Designated Trails – Recreation and Visual Resources* and *Wild and Scenic Rivers* sections. Secondary impacts to recreation from not managing these special designations (e.g., trail viewshed protections that also limit development in important recreation areas) are described above.

4.6.6.3.5. Alternative D

4.6.6.3.5.1. Program Management

Program management under this alternative is very similar to Alternative B, with the following differences: Alternative D closes 6,500 (as opposed to 7,500) acres to motorized activities to meet specific visitor demands in the Johnny Behind the Rocks, the Bus @ Baldwin Creek, and the Dubois Mill Site areas. In addition, the alternative closes fewer acres than Alternative B in important wildlife-dependent recreation areas (Green Mountain and Red Canyon) to ensure a diversity of wildlife-dependent recreation opportunities. The year-round closures would result in fewer acres than Alternative B but more acres than Alternative A or C trending toward primitive settings as a direct result of actions to enhance nonmotorized recreation. This trend would reduce opportunities for motorized recreation activities and enhance opportunities for nonmotorized activities.

Program management under Alternative D is responsive to visitor demands. The alternative increases (more than Alternative A but less than Alternative B) visitor services in most (10 of the 12) important recreation areas and provides for allowable use decisions that ensure the future recreational enjoyment of these areas.

As with Alternative B, Alternative D manages 6 important recreation areas (totaling 10 acres fewer acres than Alternative B) as SRMAs. In SRMAs, the recreation setting is managed to meet visitor demands for specific activities, experiences, and benefits. In these important areas, allowable uses (limits on other BLM programs) and management actions are specifically developed to sustain and/or enhance the entire recreation setting. The following important recreation areas would be in SRMAs to meet specific visitor demands: Dubois Mill Site, Johnny Behind the Rocks, the Bus @ Baldwin Creek, Sinks Canyon, Sweetwater Canyon, and Sweetwater Rocks.

Alternative D also manages four important recreation areas (not SRMAs) in a manner that meets a less specific/more diverse visitor demand in concert with other program (wildlife) objectives. Four of the important recreation areas will be managed as distinct ERMAs. Distinct ERMAs represent areas where management focuses on providing a diversity of recreation opportunities, within the confines of both recreation and non-recreation program objectives. In distinct ERMAs, allowable uses and management actions address recreation/tourism issues, activities, and conflicts and/or single important attributes (such as remoteness) of the area. This focus on harmonizing visitor services, recreation opportunity diversity, and other program priorities constitutes an increased level of visitor services over Alternative A. Four of the 12 important recreation areas will be managed as distinct ERMAs (Beaver Creek Nordic Ski Area, Green Mountain, Lander Slope/Red Canyon, and Whiskey Mountain/Eastfork).

Program management under Alternative D would protect more existing developed recreation sites than Alternative A. Alternative D would protect future developed sites and investments in the Green Mountain area only. The alternative will apply allowable use decisions to protect more important recreation areas than Alternative A.

Program management under Alternative D identifies actions (more than Alternative A but fewer than Alternative B) to enhance wildlife-dependent recreation, including:

1. Specifically identifying Green Mountain and Lander Slope/Red Canyon as distinct ERMAs for wildlife-dependent recreation.
2. Increasing visitor services in these distinct ERMAs to facilitate wildlife-dependent recreation.
3. Managing the Dubois Mill Site, Johnny Behind the Rocks, Sweetwater Canyon, and Sweetwater Rocks SRMAs to enhance specific recreation opportunities, including wildlife-dependent recreation.
4. Applying allowable use decisions in the above SRMAs to sustain/enhance the recreation setting to provide specific recreation opportunities associated with wildlife-dependent recreation.

4.6.6.3.5.2. Resources

Alternative D closes 25,425 acres to motorized vehicles year-round to protect resources. The year-round closures would result in 25,425 acres trending toward primitive settings. This trend would reduce opportunities for motorized recreation activities and enhance opportunities for nonmotorized activities. Stipulations on resources (e.g., wildlife and cultural resources) could conflict with recreation settings and opportunities in important recreation areas. These conflicts would be local and random and would occur at a much lower rate than under Alternative A.

Allowable use decisions to protect resources (e.g., wildlife) would limit development associated with resource uses, including increased road densities, decreased naturalness, and increased contacts with other humans (setting trending toward urban/industrial). Therefore, most allowable use decisions associated with resources would result in the maintenance of recreation settings.

As a result of allowable use decisions associated with wildlife, cultural resources, and visual resources, 714,824 acres of recreation setting across the planning area would be maintained. Alternative D precludes or restricts development in all important recreation areas, except those listed in Table 4.39, “Energy-Related Impacts to Recreation Areas under Alternative D” (p. 1035). Finally, allowable use decisions associated with resources would maintain or enhance wildlife-dependent recreation on 33 percent of WGFD special hunt units which would be maintained/enhanced to facilitate trophy/high-quality hunting opportunities.

4.6.6.3.5.3. Resource Uses

Because of authorized uses associated with mineral and energy resources, this alternative would result in 1,653,961 acres of recreation setting trending toward urban/industrial. This would adversely impact recreationists who seek to recreate in areas with low road densities, high levels of naturalness, and few people. Conversely, these impacts would beneficially impact recreationists who enjoy recreating in a motorized/high road density environment with numerous human disturbances and other users. Most of these impacts would be outside important recreation areas, except for the areas listed in Table 4.39, “Energy-Related Impacts to Recreation Areas under Alternative D” (p. 1035).

Table 4.39. Energy-Related Impacts to Recreation Areas under Alternative D

Important Recreation Area	Impacts
Agate Flats	Similar to Alternative C, with fewer impacts due to more restrictions to support Congressionally Designated Trails and the Sweetwater Rocks SRMA
Copper Mountain WSA	Same as Alternative A.
Muskrat Basin	Same as Alternative C.
SRMA Special Recreation Management Area WSA Wilderness Study Area	

Alternative D opens most of the planning area to ROWs and land actions. Impacts from these actions would be random and differ in scale. Locating ROWs in existing disturbed areas would not alter the recreation setting. New disturbances associated with ROWs under this alternative would result in recreation settings trending toward urban/industrial. This alternative precludes all important recreation areas from most ROW development.

Impacts to recreationists as a result of livestock grazing would be similar to Alternative C.

4.6.6.3.5.4. Special Designations

Because ACEC designations are a function of protecting relevant and important resources, impacts to recreation from the designation of ACECs are described above. Secondary impacts to recreation from management of these special designations (e.g., trail viewshed protections that also limit development in important recreation areas) are also described above. See the *Congressionally Designated Trails – Recreation and Visual Resources* section for impacts to recreation from the management of Congressionally Designated Trails and the *Wild and Scenic Rivers* section for impacts to recreation from the management of WSRs.

4.7. Special Designations

4.7.1. Congressionally Designated Trails – Cultural and Historic Resources

In the 1970s and 1980s, Congress designated the Oregon, Mormon Pioneer, California, and Pony Express NHTs. These historic trails are some of the most significant in the nation; they are prime examples of the 19th Century expansion of the United States and the mass migration west across the continent. Spanning the western half of the United States, the four NHTs all pass through Wyoming on their way to South Pass, the crossing of the Continental Divide. In the planning area, the NHTs follow essentially the same route as they wind through the Sweetwater Valley. The landscape the trails traverse in this area is little changed from the mid-1800s, with few modern developments. Because the NHTs retain excellent historical settings in this area, the National Park Service has designated the entire route in the planning area as a High Potential Segment, which the National Trails System Act defines as a trail resource most worthy of protection and preservation.

In the late 1990s and 2000s, public use of the NHTs increased, primarily because of an increase in interest by groups from the Church of Jesus Christ of Latter-day Saints. Their interest in commemorating and experiencing what their pioneer ancestors went through led to reenactments of handcart and wagon treks along the NHTs. At one point during the early 2000s, as many as 12,000 people per year with handcarts and support vehicles, walked parts of the NHTs in the planning area. This activity adversely impacted the trails and their settings. Restrictions on the number of trekkers were eventually instituted, and impacts are now more under control.

Adverse impacts to NHTs typically result in a loss of integrity of the resource, or in some cases a loss of archeological information. Adverse impacts to significant trail resources on BLM-administered lands occur for several reasons, including actions that physically damage or destroy all or parts of an NHT; actions that alter a significant element of a trail; actions that introduce visual, atmospheric (air), or audible (noise) elements that can diminish the historical integrity of an NHT; and a lack of action, which, in certain cases, can allow a trail resource to deteriorate. Adverse impacts can also occur to NHTs from increased access to areas with trail resources, resulting in increased use, erosion, looting, and vandalism.

The four NHTs are all highly significant for their associations with important events in American history. In the planning area, these NHTs are also significant for their good to excellent historical settings, which help visitors imagine what it was like along these trails in the 1800s. Adverse impacts to these values can result for the reasons described above, and would be both short-term and long-term because some adverse impacts can be reversed while others cannot.

In some cases, NHT resources are also significant for their scientific data potential, especially at historic sites along the NHTs. Actions that cause physical damage or destruction, or the lack of action and neglect, can result in adverse impacts to these resources. These impacts would be long-term because, once a resource is damaged or disturbed, the impact cannot be reversed.

Beneficial impacts to NHTs occur from management actions that enhance the quality of that resource. Stabilization and repair of historic structures at Gilespie Place, fencing around standing structures and gravesites along the trails, and erosion control measures are examples of actions that result in beneficial impacts. Most of these beneficial impacts would be long-term, but eventually, adverse natural and/or human influences would require more measures to keep these resources from degrading.

Congressional designation of a trail as part of the National Trails System signifies that the resource is of exceptional scenic, recreational, and/or historic value.

4.7.1.1. Summary of Impacts

Impacts to NHTs vary by alternative in the following ways: (1) alternatives A and C are similar in their protections, but Alternative A generally affords more protections than Alternative C; (2) alternatives A and C focus on protecting the immediate area around NHTs, but do not address visual impacts farther away from the trails; (3) Alternative B provides much better protection for NHTs and protects historic settings to a high degree; (4) Alternative D is far more protective than either Alternative A or Alternative C, and somewhat less protective than Alternative B.

4.7.1.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- NHTs, especially High Potential Sites and Segments, are managed and protected in accordance with the National Trails System Act, the NHPA, and BLM IM Washington Office-2009-215 (BLM 2009m).
- Activities occurring on private lands will not be affected by any BLM management prescriptions unless those activities involve federal assistance or require a federal license. For

instance, if a landowner or land user wishes to have a privately-funded, privately-licensed development (e.g., and oil and gas well, a wind tower, a livestock reservoir, a cabin, etc.) built on private land, there is no BLM involvement. However, if the development involves federal assistance or requires a federal license, then BLM would be required to take into account the development's impacts upon important cultural resources, including the NHTs.

- Direct and indirect impacts can result from a variety of natural and human-caused actions, such as those that physically alter, damage, or destroy all or part of the trail; improved access, which brings increased use to an area, altering characteristics of the surrounding environment that contribute to trail importance; the introduction of visual or audible elements out of character with the trail or that alter its historic setting; and neglect of the trail to the extent that it deteriorates or is destroyed.
- The BLM encourages opportunities to cooperate with private landowners to minimize or eliminate disturbance to NHTs.
- Recognizing that historic trails often comprise numerous routes rather than a single trace, all protective zones are measured from the outer edges of the trails rather than at a centerline.
- Programmatic management for units of the NLCS, including Congressionally Designated Trails, is ¼ mile from the edges of the trails plus such additional distance to avoid or mitigate adverse effects as defined by the NHPA.
- Certain projects, due to size or topography, could require consideration of visual intrusions into the setting beyond the foreground or middleground zones to avoid or mitigate adverse effects as defined by the NHPA.
- Recreational or heritage tourism use of the NHTs will increase over time. Overuse of NHTs on public lands will be controlled through permitting mechanisms and special use permits.
- Without allowable use decisions along the NHTs and associated landscapes, future actions/authorizations will continue to conflict with the enabling legislation and supporting documentation of the NHTs.
- The direction in the enabling legislation and supporting documentation will be better achieved through complementary allowable use decisions (e.g., NSO for oil and gas).
- Alternatives that protect a larger landscape around trails will better achieve the direction contained in the enabling legislation and supporting documentation associated with the NHTs.

4.7.1.3. Detailed Analysis of Alternatives

4.7.1.3.1. Impacts Common to All Alternatives

Standard procedures have been developed over the years to help address potential adverse impacts to NHT resources. Because they are Congressionally Designated Trails, priority is given to avoiding or mitigating impacts from development and use. Standard management and protection procedures, guided by the National Trails System Act and the NHPA, include avoidance, screening projects from the trails behind natural features, innovative redesign or camouflaging of projects, and using existing disturbances along trails for placement of projects. These standard procedures have protected NHT resources from adverse impacts and damage in many cases. However, if total avoidance has not been feasible, mitigation measures designed to minimize impacts to the trails and their historic settings have been continually improved and implemented over the years. All of the alternatives are guided by these standard procedures.

However, the standard procedures have not always adequately protected the historic settings of NHTs. For example, large and visible projects some distance away have intruded on their intact historic settings. A modern powerline a few miles from the Oregon Trail has resulted in adverse impacts to its historical integrity.

Another type of adverse impact to NHT resources common to all alternatives is from increased public use of lands, which can occur for several reasons. One is improved access to formerly remote areas. This is common in areas where development allows for the creation of new roads. Another reason is the increased popularity and availability of OHVs, which also allows access to formerly remote areas. A third reason is increased public interest in specific historic sites or areas. This is an especially serious impact from users of the Mormon Pioneer NHT. As public use of lands increases from all these causes, so can the impact to NHT resources. As more use occurs, more NHTs are visited and walked or driven over. Some of these resources have been looted or vandalized. This impact would occur under any of the alternatives because access, OHV use, and public use and interest along the NHTs are all expected to increase.

A beneficial impact common to all alternatives is the indirect protection provided by the recent greater sage-grouse Core Area management policy. Approximately 75 percent of the NHTs and their surroundings are in the Core Area, and management to protect the Core Area should also reduce adverse impacts to the settings of the NHTs.

There are also several NHT-related withdrawals that protect NHT resources (Devil's Gate, Martin's Cove, Split Rock, and Rocky Ridge) that offer protection from the impacts of mining. These are withdrawals that do not expire and do not vary by alternatives. Therefore, they are analyzed only to provide context to management that does vary by alternative.

4.7.1.3.2. Alternative A

4.7.1.3.2.1. Program Management

In 1986, the Wyoming BLM approved the *Oregon/Mormon Pioneer National Historic Trails Management Plan* (BLM 1986), which guided protection and management along BLM portions of these trails in Wyoming. In 1987, the Lander RMP used the 1986 plan as its basis for decisions affecting the NHTs. In 1999, the California and Pony Express trails, which followed the same route as the Oregon and Mormon trails in the planning area, were added to the NHTs and the same management prescriptions were adopted. This management includes restrictions on development within ¼ mile of the NHTs, and recommendations for making the trails more accessible and enjoyable for the public. Use on the NHTs has greatly increased since the late 1990s, and use restrictions were implemented in the 2000s to protect the trail from the impacts of heavy use. The protection and management procedures developed since the 1980s are still in use. Impacts to the NHTs from this management are beneficial.

4.7.1.3.2.2. Resources

Alternative A air quality management specific to the NHTs consists primarily of non-intervention, and would result in a neutral or slightly adverse impact to the NHTs. Efforts to maintain air quality around the trails would help maintain their important qualities, while degradation of air quality would adversely impact these resources by reducing the visibility of the trail setting. General air quality management under Alternative A allows degradation up to the point of concentrations allowed under the CAA. In general, this management would result a neutral or slightly adverse impact to the NHTs.

Fire and fuels management under Alternative A would have the potential to result in two kinds of adverse impacts to cultural resources: building fire lines with heavy equipment and allowing fires to burn without suppression. Fire lines impact NHTs through surface disturbance, and allowing fires to burn adversely impacts resources through burning or heating of NHT-related structures and artifacts. However, the fire and fuels program has been notified about the presence and location of the NHTs and their associated sites, and this should protect those resources from surface disturbance associated with fire suppression activities.

Alternative A designates the NHTs as VRM Class II for ¼ mile (and sometimes more) on each side. Outside this Class II area, VRM is Class IV. This management protects the immediate foreground of the NHTs, but does not protect the foreground, middle ground, or background of the NHTs outside this area. Therefore, the impacts from Alternative A would be beneficial for the first ¼ mile, and adverse thereafter. See the *Visual Resources* and *Recreation* sections for more information.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protections for NHT resources. A total of 27,728 acres surrounding the trails, and additional acres identified on a site-specific basis, are protected from surface disturbances under this alternative.

4.7.1.3.2.3. Resource Uses

Alternative A provides some protections for NHTs from locatable mineral exploration. Alternative A does not withdraw any lands from locatable mineral development. Because the NHTs are within an ACEC, Plans of Operation are required for mining activities within ¼ mile of the trails. These plans require NHPA compliance for mining exploration, but do not prohibit those operations. However, outside the withdrawals and the ¼ mile each side Plan of Operations zone, there are no protections from locatable mineral exploration under 5 acres, and the historic settings of the trails are subject to adverse impacts due to development activities. This is especially true in areas of high potential for mining activity, such as the South Pass-Lewiston area. Current management provides some protections to the immediate foreground of the NHTs, but does not protect the historic settings of the NHTs outside this area. Therefore, impacts under Alternative A would be both beneficial and adverse. Chapter 2 describes management under each alternative and the number of acres affected by proposed land use decisions.

Under Alternative A, adverse impacts to the NHTs from leasable fluid and solid minerals, and mineral materials management would be similar to impacts from locatable minerals management. Within ¼ mile of the NHTs, NSO or closure-type stipulations are enforced to protect trail resources. However, outside the ¼ mile either side zone, there are no protections specific to development for the NHTs, and the historic setting of the trails is subject to adverse impacts. These impacts are currently managed on a case-by-case basis, and current protection measures usually focus on reducing impacts rather than preventing them. The most likely adverse impact to the NHTs would be from leasable phosphate minerals exploration, because potentially valuable phosphate outcrops cross the trails in the Upper Sweetwater River region above Sweetwater Station. Current management protects the immediate foreground of the NHTs, but is limited in protecting the historic settings of the NHTs outside this area. Therefore, impacts under Alternative A would be beneficial, but only within the ¼-mile buffer, and potentially very adverse to NHT setting.

Highly visible ROW projects, such as industrial wind-energy development, mines, gas plants, power plants, and large transmission lines, can adversely impact NHTs in substantial ways. For example, wind turbines rising to 400 or more feet or a gas plant near an NHT with good historical settings would seriously and adversely impact the trail's value as a historic resource. Alternative A includes no protections from these types of projects beyond standard NHPA measures. The most highly visible ROW projects anticipated along the NHTs are wind-energy developments and associated large transmission lines, due to high wind-energy potential in the area.

Under Alternative A, adverse impacts to the NHTs from range improvement projects would be similar to impacts from leasable fluid minerals, leasable solid minerals, and mineral material management, although likely on a lesser scale. Within ¼ mile of the NHTs, avoidance-type stipulations for range developments are typically enforced to protect trail resources. However, outside ¼ mile on either side, there are no RMP protections specific to development for the NHTs, and the historic setting of the trails would be subject to adverse impacts due to the introduction of infrastructure and livestock and the loss of vegetation often associated with these types of improvements. These adverse impacts would be managed on a case-by-case basis, and protection measures under Alternative A focus on reducing adverse impacts rather than preventing them. The most likely adverse impact to the NHTs would be from fencing projects that cross the NHTs, which are periodically proposed and sometimes allowed. Alternative A management protects the immediate foreground of the NHTs, but is limited in protecting the historic settings of the NHTs outside this area. Therefore, impacts under Alternative A would be both beneficial and adverse.

Recreational activities along the NHTs have increased substantially since the mid 1990s, and impacts to the trails have risen accordingly. Alternative A provides for the permitting of larger groups using the NHTs, which would help keep adverse impacts to the trails to a low level. This management has slowed impacts to the trails, but has not prevented them. As a result, there would be a low level of adverse impacts from recreation management impacts under Alternative A.

4.7.1.3.2.4. Special Designations

Under Alternative A, the NHTs are recognized as Congressionally Designated Trails and an ACEC. These designations come with protective measures, which were incorporated into the 1987 RMP. These protections beneficially impact the NHTs.

4.7.1.3.3. Alternative B

4.7.1.3.3.1. Program Management

Alternative B increases proactive management over Alternative A. Management under Alternative B provides much more focus and attention to the protection and recreational uses of the NHTs.

4.7.1.3.3.2. Resources

Alternative B specifies that air quality management reduce emissions and improve air quality. This action would beneficially impact NHTs more than Alternative A by improving trail settings.

Alternative B specifies that full suppression would be used near identified cultural sites, such as the NHTs, to protect them from the impacts of fire. Identifying the NHTs in advance, making firefighters aware of their locations, and planning for their protection would preserve important resources, and prevent impacts from fire suppression activities.

Alternative B manages more lands as VRM Class I and II visual resources than Alternative A; this would help protect NHT resources and their settings from the introduction of modern visual intrusions. The entire historic setting of the NHTs is in a VRM Class II area under Alternative B, which would provide substantially better protections for the historic settings of the trails than would Alternative A. See the *Congressionally Designated Trails – Recreation and Visual Resources* section for more information.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are greatest under Alternative B, providing additional protections for NHT resources and reducing adverse impacts. This is particularly true in connection with protections for the benefit of greater sage-grouse nesting habitat and leks. Under Alternative B, 1,229,358 acres are within the 15-mile protection buffer, and 89 percent of those acres are closed to surface disturbance primarily for the protection of greater sage-grouse.

4.7.1.3.3.3. Resource Uses

Unlike Alternative A, which proposes to withdraw no new lands from locatable mineral entry, Alternative B proposes to withdraw 1.6 million acres. This would protect NHT resources from potential disturbances that would adversely affect the NHTs because this area includes most of the historical setting of the NHTs. Although there are limited locatable minerals identified in this area, exploratory activity does take place and involves surface-disturbing activities that adversely impact setting. Alternative B would result in the most substantial beneficial impacts in the South Pass-Lewiston area, where impacts from mining would be most likely to occur along the NHTs.

Alternative B closes or places major constraints on leasable fluid and solid minerals, and mineral materials exploration and development on much more land than Alternative A; this would protect NHTs from potential disturbances. Alternative B closes NHTs and almost all of their historical settings; this would provide much better protections than Alternative A and no adverse impacts to the NHTs would occur from these activities. This management would result in the most substantial beneficial impacts in the Upper Sweetwater River area, where impacts from phosphate mining would be most likely to occur along the NHTs. Although the areas closed under Alternative B have low or no potential for oil and gas, this management would ensure that the setting is protected even if technology changes over the next 20 years.

Alternative B restricts wind-energy development, powerlines, and gas plants, and large ROWs to a much greater extent than Alternative A (1,919,029 acres). This alternative closes the entire length of the NHTs from wind-energy development, large mines, and ROWs for a distance of approximately 15 to 20 miles; this would be much more protective to NHTs than Alternative A. These large projects are the most likely to adversely impact NHT settings because they provide a high level of contrast due to their size and design. Alternative B would result in more beneficial impacts than Alternative A because it limits perpendicular trail crossings to only a limited number of identified locations and therefore would prevent ROW intrusions on the NHTs.

Alternative B closes more areas to visible range improvement projects than Alternative A; this would protect NHTs from potential disturbances. NHTs and 3 miles either side are closed to visible range developments; therefore, Alternative B would provide much better protections than Alternative A. It is not possible to determine the number of acres closed to range improvement projects under Alternative B because that would depend on whether the project would be visible from the NHTs, which requires a site-specific analysis. However, it is likely that a project within 3 miles of the NHTs would be visible. This management would mostly affect fencing projects that would cross the NHTs.

Alternative B directs more recreational activities to the Auto Tour Route, and places more emphasis on trail protection on the Group Reenactment and Undeveloped sections of the trails. This would provide slightly to moderately more protections than Alternative A. Refer to the *Congressionally Designated Trails – Recreation and Visual Resources* section for an analysis of this impact.

4.7.1.3.3.4. Special Designations

Under Alternative B, the NHTs ACEC is expanded to five miles on each side of the trails. This would enhance the protection of NHTs by reducing the potential for adverse impacts to their intact historical settings. This alternative provides much greater protection for the NHTs compared to Alternative A. However, this management is somewhat redundant to the Alternative B withdrawal of 5 miles from locatable minerals since the main management tool that comes with ACEC designation is the requirement of a Plan of Operations for mining development less than 5 acres. Since Alternative B withdraws these lands there is no need for a Plan of Operations, except for locations where a claim has already been staked.

4.7.1.3.4. Alternative C

4.7.1.3.4.1. Program Management

Alternative C decreases proactive management as compared to Alternative B. The minimum actions necessary to comply with regulations will be applied to the NHTs, which would increase adverse impacts to all the NHTs in the planning area.

4.7.1.3.4.2. Resources

Alternative C manages air quality the same as Alternative A, and would result in the same marginally adverse impacts to the NHTs, compared to Alternative B, which would result in more beneficial impacts both from site-specific air resources management and overall air quality management.

Alternative C fire and fuels management would result in adverse impacts the same as Alternative A, and more than Alternative B.

Alternative C classifies less land as VRM Classes I and II than Alternative A, and substantially less than Alternative B, which would provide less protection for NHTs from visual modern intrusions. Alternative C designates a smaller area around NHTs as VRM Class II, and designates the surrounding areas as VRM Class III. Therefore, Alternative C would result in more adverse impacts than Alternative A or B because the historical setting of the NHTs would be degraded due to modern developments. See the *Congressionally Designated Trails – Recreation and Visual Resources* section for more information.

Because Alternative C places more emphasis on resource use, it includes fewer restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations). Therefore, Alternative C would result in more adverse impacts to NHTs than alternatives A and B. These impacts are described in other resource sections. The most substantial difference between alternatives B, A, and C is the acreage are closed to surface disturbance for the protection of greater sage-grouse. Because much of the NHTs are in areas closed for this reason (approximately 89 percent of the 15 miles on either side of the NHTs are in areas closed under Alternative B), this sensitive species management would result in substantial beneficial impacts to NHTs that would be minimal under alternatives A and C.

4.7.1.3.4.3. Resource Uses

Alternative C provides almost no protection for NHTs from locatable mineral exploration. Locatable minerals mining regulations do not follow the standard protection measures described above and, unless the exploration disturbs more than 5 acres, NHTs are afforded little or no protection from the impacts of this type of mining. Because Alternative C does not include NHT and South Pass Historic Mining Area ACECs, lands in those ACECs under other alternative would not be subject to Plans of Operation protections under this alternative. Therefore, Alternative C does not protect NHTs from the adverse impacts of locatable mineral developments. This is especially true in areas of high potential for mining activity, such as the South Pass-Lewiston area.

Under Alternative C, adverse impacts to the NHTs from leasable fluid minerals, leasable solid minerals, and mineral materials management would be similar to adverse impacts under Alternative A, and would be substantially more adverse than under Alternative B. NSO and closed-type stipulations are enforced to protect NHTs only within ¼ mile of either side. Outside the ¼-mile buffer, there are no limits on mineral development, and the historic setting of the trails would be subject to adverse impacts. These impacts are managed on a case-by-case basis, and protection measures focus on reducing impacts rather than preventing them. Alternative C management protects the immediate foreground of the NHTs, but is limited in protecting the historic settings of the NHTs outside this area; Alternative B extends the protections for 15 to 20 miles. Therefore, the impacts under Alternative C would be similar to impacts under Alternative A, and substantially more adverse than under Alternative B. The most likely impact to the NHTs would be from leasable phosphate minerals exploration, because potentially valuable phosphate outcrops, covering approximately 26,800 acres, cross the trails in the Upper Sweetwater River region above Sweetwater Station.

Alternative C management of wind-energy developments, mines, and large ROWs is the same as Alternative A and would result in impacts much less beneficial than Alternative B. Highly visible ROW projects, such as wind-energy developments, gas plants, power plants, and large transmission lines, can adversely impact NHTs in substantial ways. For example, a wind-energy development or gas plant near an NHT with good historical settings would seriously impact the trail's value as a historic resource. Alternative C includes no protections from these types of projects other than standard NHPA measures. Because there are lands with high potential for industrial wind-energy development open under alternatives A and C, lands that are exclusion areas under Alternative B, it would be likely that there would be adverse impacts from this type of development under Alternative C. The most highly visible projects anticipated along the NHTs are wind-energy developments and associated large transmission lines, due to high wind-energy potential in the area.

Under Alternative C, adverse impacts to NHTs from range development projects would be similar to impacts under Alternative A. Alternative C enforces avoidance-type stipulations within ¼ mile on either side of NHTs to protect trail resources. However, outside the ¼-mile on either side buffer, there are no protections for NHTs specific to range improvement projects, and the historic setting of the trails would be subject to adverse impacts similar to those under Alternative B. These impacts would be managed on a case-by-case basis, and protective measures would focus on reducing impacts rather than preventing them. Alternative C management protects the immediate foreground of the NHTs, but is limited in protecting the historic settings of the NHTs outside of that area. Therefore, impacts under Alternative C would be similar to impacts under Alternative A, and much more adverse than under Alternative B. The most likely impact to NHTs would from fencing projects that cross the NHTs.

Impacts from recreation management would be the same under Alternative C as Alternative A. See above under Alternative B for a comparison of alternatives A and B.

4.7.1.3.4.4. Special Designations

Alternative C does not include any ACECs or WSRs. Under Alternative C, Congressionally Designated Trails would be generally protected out to ¼ mile on each side, except from locatable minerals exploration. Alternative D retains the pre-FLPMA withdrawals but does not include new locatable mineral withdrawals. This alternative removes withdrawals and opens the lands along the NHTs to unrestricted mining. Therefore, Alternative C would result in more adverse impacts than Alternative A.

4.7.1.3.5. Alternative D

4.7.1.3.5.1. Program Management

In a general, Alternative D includes the same level of proactive management as Alternative B, which is more than alternatives A and C. Alternative D would better prevent impacts to Congressionally Designated Trails than current management (Alternative A) by more fully protecting the historical settings of the trails and their associated sites than Alternative A or C, and almost as well as Alternative B.

4.7.1.3.5.2. Resources

Like Alternative B, Alternative D specifies that air quality management reduce emissions and improve air quality. Any changes in air quality would not be allowed to adversely impact the current settings of trails. This management would result in more beneficial impacts than alternatives A and C, which attempt to mitigate air quality impacts on a case-by-case basis and authorize increased emission levels.

Alternative D management of soil and water resources would be less beneficial than management under Alternative B, but more beneficial than management under alternatives A and C. Restrictions under Alternative D in terms of limiting surface disturbance are not as broad as under Alternative B, but would provide much more protection than Alternative A or Alternative C. Alternative D protections for greater sage-grouse close fewer acres to surface disturbance than Alternative B, but substantially more acres than Alternative A or Alternative C. Consequently, Alternative D special status species management would be substantially more beneficial to NHTs than Alternative A or Alternative C, and almost as beneficial as Alternative B.

Alternative D classifies approximately 544,183 more acres of BLM-administered surface as VRM Classes I and II than Alternative A, but 539,028 fewer acres than Alternative B. Therefore, Alternative D would protect substantially more trail resources from the introduction of modern visual intrusions than alternatives A and C, but substantially less than Alternative B. Alternative D classifies utility corridor crossings as VRM Class III, the same as Alternative B and more protective than alternatives A and C. Alternative D prohibits other crossings and would result in beneficial impacts similar to Alternative B, but slightly less.

In general, restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological, and visual resources) are the most under Alternative B, with Alternative D providing a moderate amount of protection and alternatives A and C affording substantially less protection for cultural resources.

4.7.1.3.5.3. Resource Uses

Alternative D proposes to withdraw more acres (19,741) of mineral estate from locatable mineral entry than Alternative A, but much less than Alternative B, which proposes to withdraw 1,632,605 acres. The alternatives A, C, and D withdrawals focus on specific trail-associated historic sites, while Alternative B proposes to withdraw the entire landscape out to 5 miles around the trails. For lands most likely to be developed for locatable minerals, Alternative D provides for an ACEC of 124,229 acres, resulting in Plans of Operations being required for a sizeable area near South Pass. Therefore, Alternative D would result in more beneficial impacts than alternatives A and C, but less than Alternative B, which proposes to withdraw these lands from mineral entry. Although some of the lands that are proposed for withdrawal under Alternative B have very low or no identified potential for locatable minerals, that is not the case in all areas, particularly near South Pass. While the requirement for a Plan of Operations provides more flexibility for the BLM to avoid adverse impacts associated with small exploration operations, it does not preclude adverse impacts; therefore, Alternative D would result in substantially fewer beneficial impacts than Alternative B.

Alternative D applies NSO stipulations for oil and gas exploration for 3 miles on either side of the trails, versus ¼ mile either side under alternatives A and C. This translates to approximately 244,557 more acres of protection under Alternative D than alternatives A and C. Alternative D also protects the trails through CSU stipulations 3 to 5 miles on either side. NSO stipulations prevent surface disturbance much like a closure to leasing, but they do allow for exceptions if there would be no impacts to trails. CSU stipulations allow surface disturbance if it results in no more than a weak visual contrast with trails. Alternative B closes oil and gas leasing for 5 miles on either side of the trails, which covers approximately 427,925 acres. The stipulations under alternatives B and D are designed to protect the historical settings of trails from the impacts of modern development. As a result, beneficial impacts under Alternative D would be greater than under alternatives A and C, but somewhat less than under Alternative B. The potential for oil and gas along the NHTs in the planning area is rated as “very low” or “none,” so NSO and CSU restrictions are not expected to have any substantial impact on oil and gas exploration in this area.

Alternative D prohibits geophysical exploration in NSO areas, along trails, and in trail-related SRMAs during heavy recreational use periods. This exceeds the case-by-case allowance under alternatives A and C, but closes fewer acres than the 1,898,090 acres closed under Alternative B. Although Alternative D would less beneficial than Alternative B, the lower level of impact from geophysical exploration would make this a less important issue because geophysical exploration would likely not be visible beyond 1 mile.

Alternative D manages leasable solid minerals, mineral materials disposals, and major realty actions the same as Alternative B, and would be much more protective than alternatives A and C. Under Alternative D, from 0 to 5 miles on either side of the trails, leasable and mineral materials projects are closed unless they would not adversely impact trails (552,229 acres). This is in contrast to alternatives A and C, which close an area from 0 to ¼ mile either side of trails (27,728 acres). Therefore, beneficial impacts would be greater under alternatives B and D than under alternatives A and C. The potential for leasable solid minerals is generally low along the NHTs, so restrictions are not expected to have substantial impacts on development of these minerals.

Alternative D restricts high-profile/highly visible projects such as wind-energy development, power and gas plants, and large ROWs to a much greater extent than alternatives A and C, but less than Alternative B. Alternative D allows at most a weak visual contrast beyond 5 miles for these projects, while Alternative B prohibits these projects out to 20 miles from the trails unless they could not be seen. Alternatives A and C extend protection to ¼ mile on either side of trails. Therefore, Alternative D would result in much more beneficial impact than alternatives A and C, but less than Alternative B. The most highly visible ROW projects anticipated along the NHTs are wind-energy developments and associated large transmission lines, due to high wind-energy potential in the area.

Alternatives A, C, and D manage range developments and minor realty actions essentially the same and less restrictively than Alternative B. Range improvement projects and minor realty actions are subject to visual resource conformance along the trails under Alternative D, while Alternative B prohibits range improvement projects within 3 miles and minor realty actions within 5 miles on either side of trails. Therefore, beneficial impacts under Alternative B would be much greater than under alternatives A, C, and D. However, expected adverse impacts from these types of projects are usually not major.

Alternative D allows fewer major ROW crossings of the trails than alternatives A and C, but more than Alternative B. Crossings are in three designated corridors under Alternative D; Alternative B includes one designated crossing. Conversely, alternatives A and C allow proposed crossings to be analyzed on a case-by-case basis. All alternatives include restrictions on crossing widths, but Alternative B is most restrictive. Beneficial impacts to trails would be highest under Alternative B, almost as high as Alternative B under Alternative D, and lowest under alternatives A and C.

4.7.1.3.5.4. Special Designations

ACECs, Congressionally Designated Trails, WSRs, and WSAs in the planning area limit surface disturbances in various ways. These limits include NSO restrictions for oil and gas, mining Plans of Operation, avoidance of major ROWs, etc. These prescriptions protect trails through avoidance of physical and visual disturbance in those areas. Under Alternative D, managing the Congressionally Designated Trails as a Heritage Tourism and Recreation Corridor (for 5 miles on either side of the trails) protects 427,925 acres of trail remains and their historic settings from disturbance. Alternative D would result in more beneficial impacts than Alternative A because it protects 391,539 more acres, while Alternative B affords essentially the same protections as Alternative D by designating a 5 mile corridor on either side of the trails as an ACEC. Alternative C designates no ACECs, but affords the same protections as Alternative A.

Although not an environmental impact, managing the lands around the Congressionally Designated Trails in a cohesive and synergistic way would promote public interest by making the overall management more understandable and predictable and allowing the BLM to process land use applications more efficiently and consistently. In this regard, alternatives B and D would be more beneficial than alternatives A and C.

4.7.2. Congressionally Designated Trails – Recreation and Visual Resources

4.7.2.1. Summary of Impacts

This section focuses specifically on analyzing impacts to recreation and visual resources in Congressionally Designated Trails landscapes. This includes the foreground/middleground zone, which is 0 to 5 miles, and the background zone, which is 5 to 15 miles in any direction from an NHT or the CDNST.

Trends in recreation setting and activity opportunities and the impacts thereto along Congressionally Designated Trails under various BLM management actions mirror those identified in Table 4.33, “Impacts to Recreation Setting by Alternative” (p. 1020) in the *Recreation* section.

BLM management actions under other programs limit the BLM's ability to accommodate visitor demand for beneficial outcomes. For example, accommodating visitor demand for specific beneficial outcomes would be almost impossible in an area targeted for heavy energy development. Conversely, SRMA management objectives focus specifically on beneficial outcomes for visitors. Therefore, the beneficial recreation outcomes targeted under each alternative serve as anticipated beneficial impacts. Table 4.40, “Congressionally Designated Trail Recreation Areas Managed for Beneficial Outcomes” (p. 1047) lists the acres of recreation-specific beneficial outcomes and the sectors where benefits would be anticipated as a result of SRMA management for Congressionally Designated Trails.

Table 4.40. Congressionally Designated Trail Recreation Areas Managed for Beneficial Outcomes

Recreation Area (Priority Activities)	Beneficial Outcomes to:	Acres by Alternative Managed for Beneficial Outcomes			
		Alternative A	Alternative B	Alternative C	Alternative D
NHTs Group Use Area (Cultural site visitation, learning cultural heritage, teaching cultural heritage, photography, and historic reenactment)	Individuals, communities, and the environment	0	37,233	0	Same as Alternative B
NHTs Auto Tour Route (Cultural site visitation, learning cultural heritage, teaching cultural heritage, photography, driving for pleasure)	Individuals, communities, the environment, and economies	0	25,098	0	Same as Alternative B
Congressionally Designated Trails Undeveloped Recreation Area (Cultural site visitation, driving for pleasure, photography, horseback riding, hiking/backpacking, hunting)	Individuals, communities, and the environment	0	95,711	0	92,598

Recreation Area (Priority Activities)	Beneficial Outcomes to:	Acres by Alternative Managed for Beneficial Outcomes			
		Alternative A	Alternative B	Alternative C	Alternative D
Alkali Basin of the CDNST (Horseback riding/packing, hiking/backpacking, mountain biking, hunting)	Individuals, Communities, the Environment, and Economies	0	37,384	0	Same as Alternative B
Sweetwater Historic Mining Area of the CDNST (Cultural site visitation, driving for pleasure, photography, horseback riding/packing, develop site camping, hiking/backpacking, mountain biking)	Individuals, the environment, and economies	0	45,394	0	Same as Alternative B
CDNST Continental Divide National Scenic Trail NHT National Historic Trail					

As discussed in the *Visual Resources* section of this chapter, VRM Classes establish a measurable standard for the amount of change allowed to the visual character of a specific area. See the *Visual Resources* section for VRM Class definitions. Table 4.41, "VRM Classes as Percent of Congressionally Designated Trails Landscape " (p. 1048) compares acres of VRM Classes in Congressionally Designated Trails corridors under each alternative. The VRM Classes represent the allowable levels of impacts to visual resources.

Table 4.41. VRM Classes as Percent of Congressionally Designated Trails Landscape

Class	Alternative A	Alternative B	Alternative C	Alternative D
Class I	3	3	3	3
Class II	12	91 (+79)	2 (-10)	44 (+32)
Class III	10	3 (-7)	50 (+40)	49 (+39)
Class IV	75	3 (-72)	45 (-30)	4 (-71)
Source: BLM 2009a Note: The numbers in parenthesis represent the percent increase or decrease, compared to Alternative A.				

4.7.2.2. Methods and Assumptions

The recreation and visual resources analysis for Congressionally Designated Trails evaluates the level of impacts to the landscape (15 miles either side of the trail) and physical trail resource. This analysis used all methods listed in the *Recreation* and *Visual Resources* sections. The entire Congressionally Designated Trails landscape is considered an important recreation feature in the planning area. The Congressionally Designated Trails areas listed in Table 4.40, "Congressionally Designated Trail Recreation Areas Managed for Beneficial Outcomes" (p. 1047) represent portions of the trails with access and important visitor services that increase visitor focus in the area. This section refers to those visitor focused trail areas.

This analysis used the following assumptions:

- Absent decisions on allowable use along trails and associated landscapes, future actions and authorizations will continue to conflict with the enabling legislation and supporting documentation of the CDNST.
- The direction in the enabling legislation and supporting documentation will be better achieved through complementary allowable use decisions (e.g., NSO).

- Alternatives that protect a larger landscape around trails will better achieve the direction in the enabling legislation and supporting documentation associated with the CDNST.

4.7.2.3. Detailed Analysis of Alternatives

4.7.2.3.1. Impacts Common to All Alternatives

See *Impacts Common to All Alternatives* in the *Recreation* and *Visual Resources* sections.

4.7.2.3.2. Alternative A

4.7.2.3.2.1. Program Management

Program management under this alternative does not focus on identified customer demand for recreation settings, activities, and/or outcomes in the Congressionally Designated Trails landscapes. Under Alternative A, visitor services are a function of actions to protect resources, mitigate use and user conflicts, and protect human health and safety. That is, visitor services under this alternative focus on accommodating priorities of other BLM programs rather than of accommodating visitor demand for beneficial outcomes.

Alternative A program management protects several existing developed recreation sites, but does not include allowable use decisions to protect important recreation areas. Protections under this alternative would maintain existing investments and physical trail remains, but the alternative does not include future development of new recreation sites or maintenance/enhancement of important areas. Program management under this alternative would not sustain or enhance the recreation settings of visitor focused trail areas. Therefore, Alternative A recreation management in Congressionally Designated Trails corridors would not meet specific visitor demands for recreational opportunities (activities and outcomes).

Alternative A program management would result in long-term adverse impacts to visual resources along Congressionally Designated Trails because almost 85 percent of trails landscapes will be managed for the lowest level of scenic quality protection. This alternative allows surface-disturbing activities on almost 85 percent of trails landscapes, activities that can create a moderate to strong visual contrast. In addition, the remaining 12 percent of trails landscapes in VRM Class II corresponds to a ¼-mile buffer either side of NHTs. There would be impacts to visual resources outside this ¼-mile buffer, which would create contrast at the Class III and IV levels. Therefore, the Class II designation would not be effective for maintaining the visual resources associated with Congressionally Designated Trails.

4.7.2.3.2.2. Resources

General impacts to the recreation environment and visual resources in Congressionally Designated Trails corridors from other BLM resource management actions would be similar to impacts discussed in the *Recreation* and *Visual Resources* sections. Specific impacts from resource management actions within ACECs are discussed below.

4.7.2.3.2.3. Resource Uses

Impacts from foreseeable resource use development in the trails landscapes under Alternative A include:

- There would be impacts from oil and gas exploration and development in the Crooks Gap/Bairoil portion of the CDNST landscape. Alternative A allows activities associated with this development on and along the CDNST and allows wildcat oil and gas exploration across the entire landscape.
- Wind-energy development would constantly be within view of the CDNST and NHTs. Development will occur within close proximity (within ¼ mile) of Congressionally Designated Trails.
- Alternative A limits ROW crossings of NHTs; however, the alternative allows ROW crossings of the CDNST. Alternative A allows ROWs within view of trails and would introduce strong levels of contrast.
- Alternative A allows phosphate development within and across the NHT landscape and within the Group Use and National Trails Undeveloped recreation areas.
- Alternative A allows mineral materials disposals throughout almost all the landscape.
- Alternative A allows actions under the 1872 General Mining Law within ¼ mile either side of Congressionally Designated Trails with Plans of Operation, and allows unrestricted actions everywhere else.
- The impacts of uranium mining under Alternative A would be evident from the CDNST and NHTs.

As a result of the activities listed above, the CDNST and NHT landscape would experience increased road densities (decreased remoteness), decreased naturalness, increases in facilities and structures, and increases in contacts with other users. These factors would cause the CDNST and NHT landscape to trend toward urban/industrial.

Visual disturbances as a result of these activities would result in strong contrast as viewed from both trails across the entire landscape. There would be impacts to visual resources in the sensitive foreground/middleground zone (0 to 5 miles) and the background zone (5 to 15 miles). All of the above actions would introduce man-made elements to a landscape that currently has very few visual intrusions. Mitigation actions would be minimally successful because Alternative A designates most of the trails landscapes as VRM Class IV, an allocation that does not provide for a justification for elaborate mitigation measures. In addition, several activities Alternative A allows in NHT corridors would be very large (e.g., wind-energy development) and out of scale with NHT landscapes. Such activities would not lend themselves to standard VRM mitigation (e.g., color or relocating the project). As a result of resource use activities Alternative A allow NHT landscapes, the entire area would move away from current visual quality levels and demonstrate VRM Class IV characteristics. The NHT landscapes would be subject to management actions that introduce major modifications to the existing character of the landscape. The level of change to the characteristic landscape would be high under Alternative A. Developments and activities under Alternative A would dominate the view and be the major focus of viewer attention.

4.7.2.3.2.4. Special Designations

See *Program Management* above for a discussion of special designations regarding trails management. Special designations in the NHT landscapes include the South Pass ACEC, the Sweetwater Canyon WSA, and the Sweetwater Rocks WSA. These designations provide protections in the NHT landscapes and limit the activities described above. However, under Alternative A these areas are isolated, which would result in “island polygons” of protections in the NHT landscapes.

4.7.2.3.3. Alternative B

4.7.2.3.3.1. Program Management

Program management under Alternative B is responsive to customer demands in the Congressionally Designated Trails landscapes. Alternative B includes more (than Alternative A) visitor services in visitor focused trail areas and provides allowable use decisions that ensure the future recreational enjoyment of these areas. Alternative B manages five visitor focused trail areas (totaling 240,820 acres) as SRMAs. In SRMAs, the recreation setting is managed to meet visitor demands for specific activities, experiences, and benefits. Within these important areas, allowable uses (limits on other BLM programs) and management actions are specifically developed to sustain and/or enhance the entire recreation setting. Under Alternative B, the following visitor focused trail areas are in SRMAs to meet specific visitor demands: NHTs Auto Tour Route, NHTs Group Use Area, National Trails Undeveloped area (contains both NHTs and the CDNST), the Alkali Basin of the CDNST, and the Sweetwater Historic Mining Area of the CDNST. Alternative B also manages the remainder of NHT resources (not in a SRMA) in a manner that meets less specific/more diverse visitor demands in concert with other program (cultural resources) objectives. Alternative B manages the remaining portions of the physical trails and ¼ mile either side of the trails as distinct ERMAs. Distinct ERMAs represent areas where management focuses on providing a diversity of recreation opportunities, within the confines of both recreation and non-recreation program objectives. In distinct ERMAs, allowable uses and management actions address recreation/tourism issues, activities, conflicts, and/or single important attributes (such as remoteness) of the area. This focus on harmonizing visitor services, diversity of recreation opportunities, and other program priorities constitutes an increased level of visitor services over Alternative A. Alternative B manages the remainder of the important recreation area as distinct ERMAs, including: the CDNST in the Crooks Gap and Bairoil areas, the Willow Creek portion of the NHT, and the NHT through mixed private and public lands from Ice Slough east to the planning area boundary.

Program management under Alternative B protects more existing developed recreation sites than Alternative A. Additionally, the alternative protects future developed sites, investments, and physical trail resources. The alternative applies allowable use decisions to protect more important recreation areas than Alternative A.

Alternative B VRM provides long-term protection for 94 percent of the NHT landscapes. This protection would be achieved through a VRM Class II designation. This is a 79 percent increase in the amount of VRM Class II designations over Alternative A. Alternative B allocates the remainder of the landscape as VRM Classes III and IV, which coincides with existing disturbances in the landscape; therefore, these designations would result in little to no change to the existing landscape. Alternative B VRM would maintain the existing visual quality of the entire NHT landscape.

4.7.2.3.3.2. Resources

General impacts to the recreation environment and visual resources of Congressionally Designated Trails landscapes from resources management actions under Alternative B would be similar to impacts described in the *Recreation* and *Visual Resources* sections of this chapter.

4.7.2.3.3.3. Resource Uses

Because Alternative B program management protects the entire Congressionally Designated Trails landscape, there would be no impacts to the recreation environment and visual resources of trail landscapes beyond those described above under *Impacts Common to All Alternatives*.

4.7.2.3.3.4. Special Designations

Compared to Alternative A, Alternative B includes more NHTs landscape in special designations. This alternative expands the South Pass, Green Mountain, and NHT ACECs. Additionally, this alternative designates the Granite Mountain and Government Draw/Upper Sweetwater Sage-Grouse ACECs. The recreation environmental and visual resources of the NHT landscapes would benefit from these additional ACECs because they would result in restrictions on development beyond those described above under *Program Management*. While Alternative B program management limits surface-disturbing activities within view of NHTs, the ACECs limit surface-disturbing activities subject to exceptions for other resource values (wildlife, visual resources, other non-trail historic resources). This means that areas of overlap between these designations and the NHT landscapes would be subject to multiple stipulations on surface-disturbing activities, further limiting the potential for change to the NHT landscapes. The synergy between program management and management of these ACECs would ensure maintenance of the entire trail landscape.

4.7.2.3.4. Alternative C

4.7.2.3.4.1. Program Management

Recreation program management under Alternative C would result in impacts the same as Alternative A, except that Alternative C provides for a ¼-mile corridor either side of the CDNST. This buffer would increase protection of the physical trail of the CDNST. Alternative C impacts to NHT landscapes would be the same as impacts under Alternative A.

4.7.2.3.4.2. Resources

Alternative C impacts to the recreation environment and visual resources of Congressionally Designated Trails as a result of resource actions would be the same as impacts under Alternative A.

4.7.2.3.4.3. Resource Uses

Alternative C impacts from resource uses would be similar to impacts under Alternative A. However, Alternative C would result in more adverse impacts to NHT landscapes because it does not include the existing South Pass and NHT ACECs. This alternative does not designate ACECs in the planning area, which would subject the trails themselves to more impacts than Alternative

A. Specifically, Alternative C does not require Plans of Operation for exploration disturbing fewer than 5 acres or for casual use or notice-level operations. This could result in damage to the NHTs themselves. In addition, because Alternative C does not designate the South Pass ACEC, resource uses in this area of the trails landscape would result in more adverse impacts than Alternative A. Designation of the South Pass ACEC under alternatives A and B would protect the area from the impacts of oil and gas, ROW, and wind-energy development. Alternative C impacts in the South Pass portion of the NHT would be the same as resource use impacts under Alternative A.

4.7.2.3.4.4. Special Designations

The only special designations under Alternative C are the existing WSAs. Impacts from WSAs would not differ by alternative and are detailed under Alternative A. See *Resource Uses* above for a discussion regarding the impacts of no special designations.

4.7.2.3.5. Alternative D

4.7.2.3.5.1. Program Management

Alternative D recreation program management is the same as management under Alternative B.

Alternative D VRM would provide long-term protection for 47 percent of the NHT landscapes. This protection would be achieved through VRM Class I (3 percent) and II (44 percent) allocation. Alternative D designates the remainder of the landscape as VRM Class III and IV, which coincides with existing disturbances in the landscape, areas beyond 5 miles of the trail, and/or areas out of view of the trail. These designations would result in little to no change in the existing landscape. Alternative D VRM would maintain the existing visual quality of the entire trails landscape.

4.7.2.3.5.2. Resources

General impacts to the recreation environment and visual resources of Congressionally Designated Trails landscapes from resources management actions under Alternative D would be similar to impacts described in the *Recreation* and *Visual Resources* sections of this chapter.

4.7.2.3.5.3. Resource Uses

Because Alternative D program management protects the entire Congressionally Designated Trails landscape, there would be no impacts to the recreation environment and visual resources of trail landscapes beyond those described above under *Impacts Common to All Alternatives*.

4.7.2.3.5.4. Special Designations

Alternative D impacts, as a result of special designations, would be the same as impacts under Alternative B.

4.7.3. Wilderness Study Areas

4.7.3.1. Summary of Impacts

All alternatives meet the statutory requirement to ensure the protection of designated WSAs so as not to preclude the ability of Congress to designate these areas as Wilderness Areas. Compared to alternatives A, C, and D, Alternative B management provides for enhanced wilderness characteristics and experiences.

4.7.3.2. Methods and Assumptions

This analysis considers impacts to wilderness characteristics of naturalness, opportunities for solitude, primitive/unconfined recreation, and special features. Impacts are limited to potential changes in wilderness characteristics for the WSAs. Impacts to WSAs are considered adverse if management actions "impair the suitability of WSAs for preservation as wilderness." See the *Recreation* and *Visual Resources* sections for impacts that would result from management actions adjacent to WSA boundaries.

Methods and assumptions used in this impact analysis include the following:

- Management of WSAs will follow the IMP (BLM 1995).
- Congress will not take action on planning area WSAs within the 20 year planning horizon.
- Impacts outside WSAs will not affect wilderness characteristics but are analyzed as impacts to recreation.
- Increased efforts to reduce motorized and mechanized travel will benefit wilderness visitors and the physical attributes of wilderness areas.
- Johnson et al. (Johnson et al. 1997) found the following livestock related factors to strongly detract from the wilderness experience: encounters in or near dispersed camps, encounters in riparian-wetland areas, encounters in meadows, manure on trails, tracks in riparian-wetland areas, and odors.

4.7.3.3. Detailed Analysis of Alternatives

4.7.3.3.1. Impacts Common to All Alternatives

There are several impacts that would not vary by alternative. Managing wildfire in WSAs by using conditional fire suppression would allow fire to play its natural role in the ecosystem, which would result in short-term impacts to the naturalness and opportunity for primitive/unconfined recreation. However, in the long term such actions would result in protections to wilderness values. Continuing to manage the eight existing WSAs under the IMP would protect the wilderness characteristics related to naturalness, and prevent impacts to the opportunity for solitude and primitive/unconfined recreation from most program activities. All alternatives require WSA management to follow the IMP; therefore, most programs would not impact wilderness characteristics in a way that would preclude the ability of Congress to designate the area as wilderness. Recreation and travel management actions for WSAs specifically related to livestock grazing do vary by alternative and would result in different impacts to wilderness characteristics.

Impacts to the WSAs from activities occurring outside the boundary of the WSAs are analyzed in the *Recreation* and *Visual Resources* sections as well as in *Special Designation* sections where appropriate.

4.7.3.3.2. Alternative A

4.7.3.3.2.1. Program Management

Closing the Dubois Badlands WSAs to OHV use would protect the wilderness characteristics in these areas by restricting activities that affect opportunities for solitude and primitive/unconfined recreation. Managing OHV use in the remaining seven WSAs as limited to designated roads and trails would provide some protection to the wilderness characteristics and mitigate impacts associated with OHV use. However, there could still be impacts in these areas from continuing proliferation of new user-created routes due to limited enforcement and implementation capabilities. The proliferation of unauthorized routes and general use of motorized vehicles in WSAs degrades the solitude, naturalness, and opportunities for primitive/unconfined recreation. Allowing over-snow vehicle use would result in short-term, temporary impacts to wilderness characteristics.

4.7.3.3.2.2. Resources

No impacts from resource management actions are anticipated from Alternative A.

4.7.3.3.2.3. Resource Uses

Alternative A recreation management does not include specific measures to manage livestock grazing in WSAs. Therefore, livestock management would follow the requirements in the IMP. Most of the WSAs are undesirable (e.g., too far from water) and/or unavailable (e.g., too steep or rocky) for livestock. The Sweetwater Canyon WSA is the exception because the major visitor focus in the area, the river, also is the major focus for livestock grazing. Alternative A allows livestock grazing to continue at the current rate authorized for the area. This would result in livestock grazing related impact to wilderness experiences stemming from encounters in or near dispersed camps, encounters in riparian-wetland areas, encounters in meadows, manure on trails, tracks in riparian-wetland areas, and odors (Johnson et al. 1997).

4.7.3.3.2.4. Special Designations

See *Impacts Common to All Alternatives*.

4.7.3.3.3. Alternative B

4.7.3.3.3.1. Program Management

Closing all eight WSAs to motorized (including over-snow vehicles) and mechanized vehicle use would protect the wilderness characteristics in these areas by restricting activities that impact opportunities for solitude and primitive/unconfined recreation. Alternative B would result in less route proliferation than Alternative A because the ease of enforcement and implementation of closures versus route-by-route decision making. This management action would enhance solitude, naturalness, and opportunities for primitive/unconfined recreation in all WSAs.

4.7.3.3.3.2. Resources

No impacts from resource management actions are anticipated from Alternative B.

4.7.3.3.3.3. Resource Uses

Alternative B recreation management actions close the fenced portion of Sweetwater Canyon WSA to livestock grazing. In all other WSAs, Alternative B management of livestock grazing will follow the requirements in the IMP. Livestock grazing may impact wilderness experiences in all WSAs not closed to livestock grazing. However, most of the WSAs are undesirable (e.g., too far from water) and/or unavailable (e.g., too steep or rocky) for livestock. The Sweetwater Canyon WSA is the exception because the major visitor focus in the area, the river, also is the major focus for livestock grazing. Alternative B closes the Sweetwater Canyon WSA to livestock grazing. Closing the area to livestock grazing would enhance all wilderness characteristics and would eliminate encounters with livestock that would adversely impact visitor experiences.

4.7.3.3.3.4. Special Designations

See *Impacts Common to All Alternatives*.

4.7.3.3.4. Alternative C

4.7.3.3.4.1. Program Management

Alternative C management for WSAs is the same as Alternative A. Therefore impacts to WSAs under Alternative C would be the same as Alternative A.

4.7.3.3.4.2. Resources

Same as Alternative A.

4.7.3.3.4.3. Resource Uses

Same as Alternative A.

4.7.3.3.4.4. Special Designations

No impacts from special designation actions are anticipated from Alternative C.

4.7.3.3.5. Alternative D

4.7.3.3.5.1. Program Management

Alternative D management for WSAs is the same as Alternative A, with the exception that Alternative D closes the Copper Mountain and Whiskey Mountain WSAs to motorized vehicles.

These areas do not have existing roads; therefore, this management would not change the WSAs. Instead it would, however, increase enforcement capabilities in these areas.

4.7.3.3.5.2. Resources

See *Impacts Common to All Alternatives*.

4.7.3.3.5.3. Resource Uses

Impacts to WSAs as a result of livestock grazing would be the same under Alternative D as Alternative A.

4.7.3.3.5.4. Special Designations

See *Impacts Common to All Alternatives*.

4.7.4. Wild and Scenic Rivers

4.7.4.1. Summary of Impacts

Alternative B provides for the highest level of beneficial impact to identified waterways with very similar beneficial impacts resulting from the management detailed in Alternative D. The major difference between alternatives B and D is that Alternative B recommends all eligible waterways as suitable whereas Alternative D recommends only those waterways found to meet suitability requirements. The management and allowable uses identified for these areas in alternatives B and D is nearly identical and therefore impacts from resources and resource uses is expected to be similar.

Alternative A provides limited direction for management of waterways, therefore it is anticipated that this alternative will have some beneficial impacts as detailed above, and some adverse impacts as detailed below.

Alternative C allows for the highest level of adverse impacts to waterways. The alternative does not recommend any eligible waterway as suitable, and also removes the majority of protections that currently overlap these waterways. Alternative C would eventually result in nearly all waterways no longer being eligible for inclusion in the NWSRS.

4.7.4.2. Methods and Assumptions

This section describes impacts to NWSRS-eligible waterway segments from management actions associated with the alternatives. Analysis of impacts to these segments is limited to a corridor ¼ mile on each side of the waterway. The indicators for this impact analysis are:

- The values or the free-flowing nature of the eligible waterways.
- Level of change to the tentative classification of eligible waterways.
- Level of change to waterway eligibility or suitability for inclusion in the NWSRS.

Table 4.42, “Waterways Eligible for Inclusion in the National Wild and Scenic River System” (p. 1058) lists the waterways found to be eligible for inclusion in the NWSRS, the ORVs along the waterways, the tentative classification of each eligible waterway, and the interim (subject to public input, EIS, and decision record for this RMP) evaluation of suitability for the waterway.

Table 4.42. Waterways Eligible for Inclusion in the National Wild and Scenic River System

Eligible Waterway	Outstanding Remarkable Values	Tentative Classification	Interim Evaluation of Suitability Factors
Baldwin Creek Unit	Scenic, Recreational, Wildlife Values	Wild	Suitable
Ice Slough	Historic Values	Recreational	Not Suitable
Little Popo Agie River	Scenic, Recreation, and Cultural Values	Wild	Not Suitable
North Popo Agie River	Scenic, Recreation, and Cultural Values	Wild	Not Suitable
Rock Creek	Historic Values	Scenic	Not Suitable
Sweetwater River Unit	Scenic, Recreational, Historical, and Ecological Values	Wild	Suitable
Warm Springs Creek	Geological and Historical Values	Recreational and Scenic (two segments)	Not Suitable
Willow Creek	Recreational and Historical Values	Scenic	Not Suitable
Wind River	Scenic and Geological Values	Scenic	Not Suitable

Methods and assumptions used in this impact analysis include the following:

- Recommending an area as suitable for inclusion in the NWSRS will result in the greatest benefit to the eligible waterways, whereas not considering suitability and maintaining eligibility will moderately benefit the waterways.
- Recommending an area as not suitable for inclusion in the NWSRS and not developing management actions to maintain eligibility and suitability will result in varying levels of impacts to the waterway. Impacts will vary based on the level of protections instituted by other programs that correspond with WSR values (e.g., cultural, recreation, visual, and wildlife resources management).
- VRM Class I or II will enhance waterways; Classes III and IV will degrade waterways.
- VRM Class I or II designations adjacent to waterways boundaries will enhance WSR values; Classes III and IV within view of the waterways (but outside of the boundary) will allow for changes to the visual environment that will impact WSR values.
- Actions that benefit primitive recreation also will benefit waterways tentatively classified as Wild.
- Limited (e.g., designated roads and trails, seasonally, and existing roads and trails) travel management decisions will not impact WSR values. Motorized vehicle closures will enhance waterways tentatively classified as Wild.
- Management actions and allowable use decisions that benefit or protect WSR values will benefit eligibility and suitability.
- Additional administrative designations such as WSAs and ACECs will benefit identified waterways, specifically in cases where the designation provides additional protections (to corresponding values) inside and outside the WSR corridor.

4.7.4.3. Detailed Analysis of Alternatives

4.7.4.3.1. Impacts Common to All Alternatives

The free-flowing character of eligible waterways will be protected to the extent that modifications such as stream impoundments, channelization, and/or rip-rapping will not be permitted along BLM shorelines. However, depending on the alternative, values could be at risk from potential minerals development, OHV activity, or other surface-disturbing activities. Also, the protection is limited because there are no federal reserved water rights established for in-stream flow purposes due to eligibility and suitability determinations. In addition, in cases where there is not a federal nexus, the BLM has no control over potential modifications of the shoreline or other development (including development related to the perfection of water rights). Because of these factors, protective management of eligible/suitable waterways will not affect existing water compacts. BLM management authority extends only to public lands in the river corridor, and there are no water rights associated with suitability determinations. A suitability determination also has no impact on existing water compacts.

Standard protective management of cultural/historic resources will maintain these values, but alone, will not provide sufficient management to maintain or enhance tentative classifications associated with NWSRS-eligible waterways. Actions that protect settings associated with cultural/historic resources vary by alternative and can result in maintenance/enhancement of values. Standard protective buffers for riparian-wetland areas will ensure protection of all eligible waterways from surface-disturbing activities. However, the corridors associated with WSRs are larger than the standard protective corridor. Therefore, portions of WSR management corridors would experience different impacts across alternatives. In addition, impacts outside the WSR corridor but within view would also vary by alternative.

The Ice Slough waterway has acreage leased for oil and gas under stipulations developed in the 1987 RMP. These oil and gas leases will remain valid until they expire in 2015. Currently, the Ice Slough area has a NSO stipulation to protect NHT resources and a CSU stipulation to protect watersheds. These existing stipulations would provide adequate protections from oil and gas development for the eligible waterway and its ORVs, thus maintaining the area's tentative classification as a recreational WSR.

4.7.4.3.2. Alternative A

4.7.4.3.2.1. Program Management

Program management under this alternative does not make suitability determinations for any NWSRS-eligible waterway, including the Baldwin Creek Unit and the Sweetwater River Unit (these waterways are called “Units” because they contain more than one segment with contributing values). BLM-administered public lands in these areas are managed to maintain the free-flowing nature, values, and tentative classifications of the waterways. Because the eligible river corridors will be subject to the existing land use plan as far as resource allocations are concerned, they could be adversely impacted on a case-by-case basis. These would be addressed through the site-specific NEPA process, with mitigation applied if appropriate. If any proposed action is found to affect the eligibility of the waterway, it is BLM policy to deny the action until suitability can be determined.

Alternative A does not make suitability determinations, designate a management corridor, or establish allowable use decisions for eligible waterways. This would result in several of the waterways and the ¼ mile corridor on either side being bisected by contrasting management stipulations (such as portions excluded, avoided, or open to ROWs). In these cases, portions of the waterway or corridor would be subjected to management inconsistencies that could change the areas' ORVs.

4.7.4.3.2.2. Resources

NWSRS-eligible waterways not in an ACEC include Rock Creek and Warm Springs Creek. To protect historic values associated with these sites, the cultural resource program prescribes several stipulations that would benefit the eligible waterway. These stipulations include limitations on surface-disturbing activities to protect important cultural resources. In addition, standard riparian-wetland stipulations also protect a large portion of these areas. As a result of these management prescriptions, little change to the Rock Creek and Warm Springs Creek waterways and associated corridors would be expected under this Alternative A. See below for additional resource protection measures associated with special designations that would benefit eligible waterways.

As a result of VRM Class I and II designations, the visual environment associated with Baldwin Creek Unit, Little Popo Agie, North Popo Agie, Sweetwater River Unit, and Wind River would remain unchanged. Conversely, VRM Classes III and IV allocations under Alternative A would result in adverse impacts to portions of the Willow Creek, Rock Creek, and Warm Springs NWSRS-eligible waterways.

4.7.4.3.2.3. Resource Uses

Table 4.43, “Impacts to Eligible WSRs Under Alternative A from Resource Uses” (p. 1060) lists the impacts to NWSRS-eligible waterways anticipated as a result of resource uses allowed under Alternative A.

Table 4.43. Impacts to Eligible WSRs Under Alternative A from Resource Uses

Eligible Wild and Scenic Rivers	Projected Impact From Resource Uses
Baldwin Creek Little Popo Agie North Fork Popo Agie	Impacts from phosphate development would be within and in view of corridors. Additionally, motorized vehicle use in the bottom of Baldwin Creek would continue to degrade the wild character of this area. These impacts would eliminate values associated with these units and eventually cause the area to no longer be an eligible waterway.
Rock Creek Wind River Willow Creek	Wind-energy development would be within view of this waterway and degrade scenic values. These impacts can be mitigated and would not result in an eligibility change to this waterway.
Warm Springs	Resource uses projected to occur within this eligible waterway include wildcat oil and gas exploration and phosphate development. In addition, wind-energy development would occur within view of the corridor. Impacts from these uses would degrade the waterway's geological and historical values. Due to the longevity of the impacts associated with these uses, it is anticipated that mitigation measures to offset degradation of values would be minimally successful. These uses and associated impacts would cause the area to no longer be an eligible waterway.
WSR Wild and Scenic River	

4.7.4.3.2.4. Special Designations

Table 4.44, "Impacts to Eligible WSRs from Other Special Designation Management" (p. 1061) lists the NWSRS-eligible waterways encompassed by other special designations and the associated management that would protect WSR values.

Table 4.44. Impacts to Eligible WSRs from Other Special Designation Management

Eligible Wild and Scenic River	Special Designation	Protective Management Associated with Special Designation that will benefit Wild and Scenic Rivers
Baldwin Creek Unit North Popo Agie	Lander Slope ACEC	Designated ACEC to protect scenic and wildlife values. Specific prescriptions that would protect values and tentative classifications include NSO to oil and gas; requirement for Plans of Operation for activities under the 1872 General Mining Law; VRM Class II; closure to mineral materials disposals; closure to phosphate mining as a result of management actions to protect water; excluded from wind-energy development and other ROWs; and closed to geothermal exploration.
Little Popo Agie	Red Canyon ACEC	Designated ACEC to protect scenic and wildlife values. Specific prescriptions that would limit surface-disturbing activities and protect values and tentative classifications include NSO to oil and gas; requirement for Plans of Operation for activities under the 1872 General Mining Law; VRM Class II; closure to mineral materials disposals; closure to phosphate and other leasable mineral materials mining; excluded from wind-energy development and other ROWs; major constraints and closed to geothermal exploration.
Ice Slough	National Historic Trail ACEC	Designated ACEC to protect historic values. Specific prescriptions that would limit surface-disturbing activities and protect outstanding remarkable values and tentative classifications include NSO to oil and gas; requirement for Plans of Operation for activities under the 1872 General Mining Law; VRM Class II; closure to mineral materials disposals; closure to phosphate and other leasable mineral materials mining; excluded from wind-energy development and other ROWs; major constraints and closed to geothermal exploration.
Willow Creek	South Pass ACEC	Designated ACEC to protect historic values. Specific prescriptions that would limit surface-disturbing activities and protect outstanding remarkable values and tentative classifications include NSO to oil and gas; requirement for Plans of Operation for activities under the 1872 General Mining Law; VRM Class II; closure to mineral materials disposals; closure to phosphate and other leasable mineral materials mining; excluded from wind-energy development and other ROWs; major constraints and closed to geothermal exploration.
Sweetwater River Unit	Sweetwater Canyon WSA	The entire unit is within the WSA boundaries. Managing the area under the IMP for lands under wilderness review would continue to maintain values and tentative wild classification.
ACEC Area of Critical Environmental Concern IMP Interim Management Policy NSO no surface occupancy ROW right-of-way VRM Visual Resource Management WSA Wilderness Study Area WSR Wild and Scenic River		

4.7.4.3.3. Alternative B

4.7.4.3.3.1. Program Management

Alternative B manages all eligible waterways as suitable, and therefore manages ¼ mile corridor on either side of these waterways to maintain and enhance values and tentative classifications. If any proposed action affects the eligibility and suitability of the river segment, it is BLM policy to deny the action until suitability can be determined.

This alternative makes consistent decisions across WSR corridors and therefore would result in no waterway corridors being bisected by contrasting management stipulations (conflicting management occurs in nearly all NWSRS-eligible segments as a result of Alternative A). The seamless management proposed under Alternative B would provide consistent protection of the values associated with these corridors.

4.7.4.3.3.2. Resources

As a result of VRM Classes I and II designations, the visual environment in all eligible WSRs would remain unchanged. Alternative B VRM also provides protections to the visual environment both inside and outside all eligible WSR corridors. Alternative B VRM designations would benefit and protect WSRs at a higher level than Alternative A. See below for additional resource protection measures associated with special designations that would benefit WSRs.

4.7.4.3.3.3. Resource Uses

Alternative B closes or excludes most surface-disturbing activities in eligible WSR corridors, which would provide maximum protection of values and tentative classifications. In addition, the alternative closes the Baldwin Creek and Sweetwater River suitable units to motorized vehicles, which would enhance the wild classifications of these systems. This alternative would result in fewer impacts to eligible WSRs from resource uses than Alternative A.

4.7.4.3.3.4. Special Designations

Alternative B applies special designations management actions on a landscape scale. These designations and associated management complement and protect all eligible and suitable WSR values and tentative classifications. Therefore, Alternative B provides more protections and benefits to WSRs than Alternative A.

4.7.4.3.4. Alternative C

4.7.4.3.4.1. Program Management

This alternative does not recommend any eligible waterways as suitable for inclusion in the NWSRS and proposes standard management for these areas. Therefore, this alternative offers fewer protections to identified waterways than Alternative A. Impacts to the eligible waterways would be the higher under this alternative than those detailed in Alternative A.

4.7.4.3.4.2. Resources

Resource protections under this alternative will not exceed standard management. *Impacts Common to All Alternatives* (above) describes impacts from standard management.

Under this alternative, most eligible waterways (except for those in WSAs, which remain VRM Class I) are managed as VRM Classes III and IV. VRM Class III and IV designations under Alternative C would allow more adverse impacts to visual resources along more NWSRS-eligible waterways than Alternative A.

4.7.4.3.4.3. Resource Uses

Impacts from resource uses to the Ice Slough, Warm Springs, Sweetwater River Unit, and Wind River waterway segments would be the same under this alternative as under Alternative A. Removal of the Lander Slope ACEC and South Pass ACECs and associated management would reduce (compared to Alternative A) protections for five of the nine NWSRS-eligible waterways. Table 4.45, “Impacts to Eligible WSRs under Alternative C” (p. 1063) details impacts to these five eligible waterways under Alternative C.

Table 4.45. Impacts to Eligible WSRs under Alternative C

Eligible Wild and Scenic Rivers	Projected Impact From Resource Uses
Baldwin Creek Little Popo Agie North Fork Popo Agie	Impacts from phosphate mining, oil and gas development, and wind-energy development would be within and in view of management corridors at higher rate under Alternative C than under Alternative A. In addition, the open two-track road in the bottom of Baldwin Creek would continue to degrade the wild character of this area. These impacts would eliminate values associated with these units and eventually cause the area to no longer be eligible as a WSR. This would occur at a faster rate and more drastic scale under this Alternative C than under Alternative A.
Rock Creek Willow Creek	Wind-energy development would be within the WSR corridor and in view of these waterways at a higher rate then under Alternative A. Extensive wind-energy development in this area would adversely impact the scenic value of the entire WSR and introduce a level of development in the corridor that would eliminate values associated with the units, and eventually cause the area to no longer be eligible as a WSR. Alternative C would result in more impacts than Alternative A.
WSR Wild and Scenic River	

4.7.4.3.4.4. Special Designations

Alternative C does not have any administrative designations except for WSAs and a ¼-mile buffer on either side of Congressionally Designated Trails. Therefore, impacts from special designations in the Ice Slough, Sweetwater River Unit, and Wind River would be the same as under Alternative A

4.7.4.3.5. Alternative D

4.7.4.3.5.1. Program Management

Alternative D program management makes suitability determinations for the Baldwin Creek and Sweetwater River Units; the remainder of NWSRS-eligible waterways will be dropped from further consideration for inclusion in the NWSRS. The alternative establishes protective management for all waterways found to meet the suitability requirements. This alternative ensures protection of values and maintenance of wild classifications. Eligible waterway and the surrounding ¼ mile corridors on either side are subject to other program management, and therefore could be subject to case-by-case actions. These would be addressed through the site-specific NEPA process, with mitigation applied if appropriate.

This alternative makes consistent decisions across waterway corridors, and therefore would result in no waterways or corridors being bisected by contrasting management stipulations (conflicting management occurs in nearly all waterway corridors under Alternative A). The seamless management proposed under Alternative D would provide consistent protections for the values associated with WSR corridors reviewed during this planning process.

4.7.4.3.5.2. Resources

Alternative D impacts would be the same as Alternative B. Although Alternative D recommends fewer waterways as suitable than Alternative B, the protections identified for these areas will maintain the values associated with all eligible waterways.

4.7.4.3.5.3. Resource Uses

Alternative D impacts to NWSRS-eligible waterway segments would be similar to Alternative B. One difference between Alternative D management and Alternative B management is that Alternative D allows motorized vehicle use in the Sweetwater River segment corridor through Sweetwater Canyon on designated roads and trails. However, this management would not be allowed to degrade the wild character of the river corridor; therefore, Alternative D impacts would be less than alternatives A and C and more than Alternative B.

4.7.4.3.5.4. Special Designations

Alternative D impacts, from special designations, would be the same as Alternative B.

4.7.5. Areas of Critical Environmental Concern

This section describes impacts to the ACECs designated in the 1987 RMP and EIS ROD, proposed expansions of those ACECs, and proposed new ACECs in the planning area (see Table 2.4, “Comparative Summary of Areas of Critical Environmental Concern by Alternative” (p. 37)), as well as impacts if no ACECs are designated. ACECs are designated to provide special management for relevant and important values, resources, natural systems, and natural hazards (referred to herein as “values of concern”). The discussion of ACECs focuses on the values of concern and potential impacts to those values from other programs. Many of the values of concern in ACECs are also resources with management independent of ACEC designation; this non-ACEC management is addressed under the relevant sections of this chapter. For example, impacts to wildlife values of concern in the Whiskey Mountain ACEC are discussed below under the ACEC, but overall impacts to wildlife from management under the alternatives appear in the *Biological Resources* section. The analysis in this section focuses on relative comparisons among alternatives of potential adverse and beneficial impacts in ACECs.

4.7.5.1. Summary of Impacts

Alternative C would have the most adverse impacts to values of concern because standard management in the ACECs under this alternative would not prevent adverse impacts to those values through mineral, realty, and other surface-disturbing activities. Alterative A has the next most adverse impacts because while 119,622 acres are designated as ACECs, 1,373,368 acres identified as relevant and important are not specially managed. Alternative D would have the second fewest adverse impacts to values of concern, and Alternative B would result in the fewest adverse impacts because it designates the most acres as ACECs.

Alternative B would have the most beneficial impacts because all ACECs are proposed for withdrawal from locatable mineral entry and closed to other mineral and realty actions. Its sage-grouse and other resource protections limit most surface disturbances so that not only are the most acres designated as ACECs, but the associated management both in and surrounding the ACEC has the most beneficial impacts to values of concern. Alternative D has the next most beneficial impacts in that while no new withdrawals occur in ACECs, other mineral development and major ROWs are more restrictive than Alternative A. Alternative C with no special ACEC management would have the fewest beneficial impacts of all alternatives.

4.7.5.2. Methods and Assumptions

ACECs are areas requiring special management to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards (43 CFR 1610.0–5). Only one management prescription comes automatically with ACEC designation; in an ACEC, a Plan of Operations for locatable mineral exploration and development is required regardless of the amount of surface disturbance, whereas outside an ACEC, a Plan of Operations is required if the area disturbed would be larger than 5 acres (43 CFR 3809). The requirement for a Plan of Operations allows the BLM limited ability to avoid or mitigate potential adverse impacts associated with locatable mining operations such as uranium and gold mines, but does not preclude development.

In an effort to limit adverse impacts to values of concern, specific management prescriptions must be adopted for each ACEC as there are no automatic management prescriptions.

Analysis of impacts to the values of concern under Alternative C assumes that management would be subject only to standard stipulations, such as limits on construction on slopes in excess of 25 percent or standard wildlife seasonal limitations unless some other non-ACEC management imposes different prescriptions such as WSAs.

Impacts of ACEC management (or non-ACEC management) were determined based on GIS data and information in the Mineral Occurrence and Development Potential Report, the RFD Scenario for Oil and Gas, and wind-energy potential. GIS data and information were overlaid with boundaries identified under Alternative B. Mineral and wind-energy potential and the specific management constraints in the area were used as the basis of analysis when comparing impacts to mineral resources from management under the alternatives.

4.7.5.3. Detailed Analysis of Alternatives

4.7.5.3.1. Impacts Common to All Alternatives

Generally, management prescriptions for the protection of air quality, geology, soil, water, and lands with wilderness characteristics would benefit ACECs by preventing the degradation of those resources located within the ACEC. This beneficial impact to ACECs would be secondary to other benefits, such as improving wildlife habitat, which is an important component of wildlife ACECs such as the Whiskey Mountain ACEC. Non-ACEC management actions to protect air quality, soil, water, and vegetation through limiting surface-disturbing activities vary by alternative depending on the number of acres protected by slope steepness, riparian-wetland buffer sizes, and the protections applied in those buffers.

The Lander Field Office staff has determined that each proposed ACEC meets the FLPMA relevance and importance criteria (BLM 2010f). This section analyzes the impacts to relevant ACEC values from management actions for other programs. Impacts to other programs from ACEC designations are addressed in resource-specific sections of this chapter. In addition, this section only analyzes impacts to the values that meet the relevance and importance criteria. Impacts to other values in the ACEC are not analyzed unless they contribute to the need for special management. For example, although the South Pass Mining District contains important wildlife habitat, its relevant and important values are limited to historic resources. Therefore management impacts to wildlife in the South Pass area are not addressed in this section.

All mineral development and other surface-disturbing or disruptive activities, such as ROWs and road development, would adversely impact elk, due both to loss and fragmentation of habitat and human presence. While more surface disturbance would result in more adverse impacts, the relationship is not linear; the first disturbances result in the greatest impacts. See the *Fish and Wildlife Resources – Wildlife* section for more information. Elk are considered values of concern in the Lander Slope, Red Canyon, East Fork, and Green Mountain ACECs.

All of the proposed ACECs are designed to protect wildlife, historic, and/or visual resources. In general, surface-disturbing activities such as mineral development and realty actions reduce the quality of habitat by causing fragmentation and removing vegetation. Often these developments also create a moderate to strong contrast with the characteristic landscape for visual resources or historical setting of ACECs. Therefore, surface-disturbing activities, regardless of the cause, generally result in adverse impacts to ACEC values. In the analysis that follows, the adverse impacts of surface disturbance will not be discussed repetitively; additional information regarding adverse impacts to wildlife, historic, and visual resources are found in those respective sections.

The impact of the sale of forest products is not expected to vary by alternative over the planning period because there is no foreseeable market for substantial quantities of saw timber. Therefore, although current ACEC management addresses the amount of board-feet of timber available in some of the ACECs, impacts from such sales are speculative. Specific future proposed projects would require implementation-level analysis.

Impacts to ACEC values from management actions for cultural and paleontological resources would be generally similar under all alternatives because of NHPA requirements. Cultural and paleontological resource management could result in limited surface disturbance and loss of vegetation if excavation is necessary. These potential impacts are addressed only for ACECs in which such surface disturbance is anticipated to adversely impact visual and historic resources, as impacts to wildlife habitat would likely be minimal.

As indicated above, ACEC designation triggers the requirement of a Plan of Operations for locatable mineral activities even if less than five acres are to be disturbed. The environmental impact of requiring a Plan of Operations is a modest to moderate inconvenience to a mining applicant in the exploratory phase since having the BLM review a Plan of Operations is administratively more burdensome than the applicant's merely filing a Notice. (Full-development mining operations generally exceed five acres of disturbance and require a Plan of Operations.) In addition, in reviewing the Plan of Operations, the BLM could require some modification of the applicant's approach in order to minimize adverse impacts, but would not prevent successful recovery of the mineral resource. The requirement for a Plan of Operations could make the mining operation more costly or more time consuming, which would be adverse impacts to the claimant. However, these are not considered adverse impacts to the locatable mineral resource, since recovery would not be precluded.

Since the management implications of Plans of Operations are the same for each alternative, the following analysis does not repeat those implications, but merely states whether or not a Plan of Operations would be required.

Restrictions on the exploration for, or development of mineral resources other than locatable minerals and realty actions would generally result in beneficial impacts to values of concern. The impacts of ACECs on those programs are analyzed in their respective sections.

All of the ACECs have management prescriptions for major ROWs such as large pipelines, transmission lines, and wind-energy developments. Impacts from smaller ROWs such as those required to access private property are not analyzed because they depend on site-specific factors. The BLM is mandated to accommodate access to private property and will always seek to co-locate minor ROWs and limit adverse impacts to resources and other uses. This type of realty action is handled on a case-by-case basis with project-level analysis in consideration of ACEC values.

Because none of the alternatives considers expansion of the road system, which would be an adverse impact because of additional surface disturbance and wildlife habitat fragmentation, there is no analysis of new roads.

Livestock grazing management varies by alternative but is authorized in all ACECs except Whiskey Mountain and most of East Fork. Similar to other surface disturbances, disturbance associated with range improvement projects would result in adverse impacts to ACEC values because of the loss of vegetation due to livestock grazing concentration and surface disturbance and the increases in habitat fragmentation, but also because of the increased potential for INNS. The more surface disturbance, the greater the adverse impacts to ACEC values. However, range improvement projects could also result in an increase in rapid improvements in riparian-wetland health with long-term beneficial impacts to wildlife, if wildlife can access the riparian-wetland areas. Impacts to ACEC values from livestock grazing are further addressed below under each alternative. In all cases, no change in grazing management would occur until monitoring and the Wyoming Standards for Healthy Rangelands assessments are done. The BLM expects to complete this process at the rate of 5 percent of the allotments per year; therefore, changes would be implemented slowly and grazing modifications made only where required to meet the Wyoming Standards for Healthy Rangelands. This gradual implementation is not further analyzed in the individual ACECs.

The difference in travel management between limiting motorized travel to designated roads and trails (Alternative B and in some cases alternatives A and D) rather than existing roads and trails (Alternative C) is the same for all ACECs. On a long-term basis, limiting travel to designated roads would reduce the density of roads, which would result in the beneficial impacts of increasing vegetation and decreasing habitat fragmentation, and often would reduce the contrast with ACEC visual resources. It is not possible to quantify these beneficial impacts to ACEC values, therefore, they are described under the alternatives as long-term benefits. Some alternatives include management that would limit mechanized travel, such as by bicycle, including on-road use and cross-country use. Mechanized travel would result in less adverse impacts to ACEC values than motorized travel, but more adverse impacts than pedestrian travel.

Management of over-snow motorized vehicle use varies by alternative and ACEC. Over-snow travel would adversely impact wildlife values and could adversely impact scenic and cultural values if it impacts below-snow vegetation and artifacts. Many of the ACECs are important to the big game winter populations that concentrate in the area for the unique habitat offered. Motorized winter travel would result in the most adverse impacts of any travel mode because it occurs at a time when game is most vulnerable and with the fewest options to evade human contact. Cross-country over-snow motorized travel, unlike other cross-country motorized travel, is allowed except where specifically prohibited.

The analysis of Alternative C addresses potential impacts to identified relevant and important values in the absence of ACEC management. Alternative C applies standard stipulations such as seasonal closures for the protection of wildlife. Although Alternative C does not designate ACECs, for simplicity, the area analyzed under Alternative C is called the ACEC to refer to the same geographic area analyzed under alternatives A, B, and D. Similarly, in analyzing proposed new ACECs and proposed expansion of ACECs not designated under Alternative A, the area analyzed is described as the ACEC or expanded area to describe the geographic area, not the management.

For all ACECs under each alternative, acreage is given for federal surface only. Management of federal mineral estate in split-estate ownership will also be governed by ACEC management actions. In no case does ACEC management apply to private or state lands, which are "clipped out" of the ACEC, even if federally owned minerals in those clipped out areas are subject to ACEC management.

Impacts common to all alternatives for each ACEC are described under *Impacts Common to All Alternatives*.

Under all alternatives, the use of heavy equipment in fire suppression would be restricted in areas containing sensitive resources. This includes all ACECs. Therefore, adverse impacts to ACEC values from the use of heavy equipment would not vary by alternative and are not further analyzed in this section. Whether or not full suppression of wildland fire is utilized varies by alternative. Full suppression could result in adverse impacts to wildlife and visual resources, at least in the short term, if resources were damaged by fire suppression efforts. Conversely, full suppression would result in short-term beneficial impacts by preventing fire damage to vegetation. However, on a long-term basis, full suppression could lead to fuels buildup and increase the risk of landscape-level fires, with substantial adverse impacts to ACEC values. Rather than repeat these potential outcomes from wildland fire, the following analysis identifies whether full suppression will be used.

All alternatives manage WSAs in accordance with the interim guidance (with minor differences in travel management not relevant here). Therefore, there would be no differences in impacts to ACEC values among the alternatives. Individual ACEC discussions include more information for ACECs that overlap WSAs.

Each of the following alternatives are analyzed separately, although this approach results in some duplication of material, such as repeating adverse impacts to wildlife in each of the ACECs in which wildlife is a value of concern. This approach is taken to accommodate readers who may be interested in only one ACEC, such as the Green Mountain ACEC, but not the Whiskey Mountain ACEC even though both have wildlife as values of concern.

4.7.5.3.2. Detailed Analysis of Alternatives – Lander Slope

4.7.5.3.2.1. Summary of Impacts

Alternatives A, B, and D designate 25,065 acres as an ACEC to protect big game winter range and scenic views. Alternative C does not designate the area as an ACEC and manages it with standard stipulations.

Alternative C would result in the most adverse impacts to ACEC values because it would manage the area with standard stipulations which would not preclude surface disturbance that would adversely impact wildlife and viewshed. Alternatives A and D have very similar management and similar impacts except that Alternative A may be somewhat more adverse because prescriptions avoid but do not explicitly prohibit potentially adverse actions such as phosphate leasing. Alternative B would result in the fewest adverse impacts to the resources of concern because it would preclude development of all leasable and salable minerals, whereas alternatives A and D would only preclude surface use for fluid mineral development and associated disturbance, such as utilities and roads required to support NSO development.

Alternative B would result in the most beneficial impacts because resources are emphasized over resource uses. Wildlife protections would be the most beneficial under Alternative B and VRM would limit the most visual intrusions. Alternative D has the next most beneficial impacts. Similar to Alternative B, VRM would restrict development. Mineral management is less beneficial in that the area is open to oil and gas development subject to NSO, rather than closed, and the area is not withdrawn from locatable mineral entry. Since there is low potential, this difference in impact may be small. Alternative A is similar in its impacts, although the ACEC is only avoided and not excluded from major ROWs, and open to phosphate leasing with surface restrictions rather than closed. Since the Lander Slope has phosphate potential, this difference between alternatives B and D may be moderate or more less beneficial. Alternative C would have the fewest beneficial impacts because VRM would allow far more adverse intrusions and oil and gas development is not limited. ROWs might adversely impact both viewshed and habitat since they are not prescribed except by slope and riparian-wetland areas.

4.7.5.3.2.2. Impacts Common to All Alternatives

The view of most of the Lander Slope ACEC is very prominent from the City of Lander and its surrounding areas. As a result, extensive surface disturbance would be highly visible and present a strong contrast with undisturbed areas. Protection of many cultural resources, including viewshed and limits on development, would also protect the relevant visual resources in the ACEC. The absence of such protection would result in adverse impacts to the ACEC.

All alternatives identify the Lander Slope as an area in which full-suppression fire management should be utilized; open the area to livestock grazing; and manage travel to meet wildlife and scenic values. Therefore, impacts from these actions would not vary by alternative.

No locatable minerals have been identified as occurring in the Lander Slope ACEC. Therefore, although the alternatives vary in their locatable mineral management, there is not likely to be any difference in impacts among the alternatives as a result of this difference in management. Accordingly, locatable minerals are not further analyzed.

4.7.5.3.2.3. Alternative A

4.7.5.3.2.3.1. Program Management

The 1987 RMP and EIS ROD designated the Lander Slope as an ACEC for wildlife, primarily for big game winter range, and for scenic values. Big game use the windswept portions of the ACEC for forage during winter when snow buries their summer range in the Shoshone National Forest. See the Lander ACEC Report (BLM 2010f) for a detailed discussion of these values. Management actions that protect physical and biological values result in direct beneficial impacts to Lander Slope ACEC wildlife by protecting forage and intact habitat, and avoiding adverse impacts to visual resources. Vegetation is managed to provide forage for the elk and mule deer populations in the ACEC.

4.7.5.3.2.3.2. Resources

General management of resources under Alternative A would result in beneficial impacts to ACEC values by protecting soil and riparian-wetland areas from disturbance. Although forest management is addressed, it is unlikely to impact ACEC values; see above under *Impacts Common to All Alternatives*. Alternative A includes some vegetative treatment in the Lander Slope ACEC to benefit wildlife forage. These treatments would result in long-term beneficial impacts to wildlife habitat by contributing to vegetative diversity and forage, and preventing INNS encroachment. However, there would be a short-term adverse impact to visual resources unless the impacts were properly mitigated. Grasslands management would have a beneficial impact to elk and mule deer.

Wildlife management in the Lander Slope ACEC includes seasonal closures for the benefit of large concentrations of wintering big game. However, wildlife management under Alternative A does not prohibit fences, which could result in adverse impacts. However, if the fences were utilized for improvement of riparian-wetland areas, a minor beneficial impact could result. Greater sage-grouse management would result in marginal beneficial impacts to ACEC values by buffering leks against surface disturbance, but only by minimal amounts.

Alternative A VRM would result in beneficial impacts to the Lander Slope ACEC by retaining (VRM Class II) or partially retaining (VRM Class III) the existing character of the landscape. This management would avoid adverse impacts to both scenic and wildlife resources by restricting development that would adversely impact visual resources and potentially fragment habitat.

4.7.5.3.2.3.3. Resource Uses

Alternative A applies an NSO stipulation to oil and gas development, which limits surface-disturbing activities.

Alternative A does not close the ACEC to phosphate or other solid mineral leasing, but places restrictions on phosphate recovery to protect sensitive visual resources and crucial wildlife habitat. In the absence of an explicit prohibition on surface occupancy for phosphate mines or outright closure to leasing, any proposal for a lease would require analysis of potential impacts, including stripping of all vegetation and soil, and surface removal of the mineral (strip mining) with severe declines in big game populations. It is likely, but not mandated, that a leasing application, a BLM discretionary activity, would be denied under Alternative A because the surface disturbance on the Lander Slope would be highly visible from Lander and the surrounding communities, and because of the loss of crucial winter habitat for big game that summer throughout the Shoshone National Forest.

Alternative A does not close the Lander Slope ACEC to mineral materials disposals which, if allowed, would likely result in a strong to moderate contrast with the landscape. Because Alternative A does not close the ACEC to such sales, they would remain a possible adverse impact and any application would need to be analyzed in accordance with NEPA.

Alternative A avoids the Lander Slope ACEC for major ROWs and corridors, which would protect habitat values by retaining vegetation, avoiding fragmentation of habitat, and preserving the viewshed. However, because Alternative A does not manage the ACEC as an ROW exclusion area, if there were no alternative location for the ROW, it would be permitted. The most likely demand for a ROW would be to support wind-energy development on public or private lands. The ACEC is not closed to wind-energy development and would consider it on a case-by-case basis.

Livestock grazing management under Alternative A allows continued construction of rangeland infrastructure, including fences and water projects. This construction, coupled with the trend of subdividing private lands, is expected to continue. As the private lands near the Lander Slope ACEC are subdivided, demand for fencing in the ACEC is expected to increase to limit conflicts among livestock, wildlife, and human uses. Moderate use of forage by livestock, as allowed by Alternative A, would leave less forage for use by wildlife.

The Bus @ Baldwin Creek, Red Canyon/Lander Slope, and Sinks Canyon climbing areas are part of the planning area-wide ERMA, with no specific management actions or identified recreational settings or experiences. Alternative A allows motorized recreation on designated roads, which would increase conflicts with animals and create pressure on wildlife. Cross-country mechanized travel is allowed, which would likely increase soil loss and fragmentation of habitat. Cross-country travel by bicycle would increase conflicts with wildlife by expanding the area for human access. Bicycles would increase adverse impacts from human contact more than pedestrian travel. Alternative A opens the Baldwin Creek climbing trail to forest product removal.

Alternative A limits motorized travel to designated roads and trails, which would likely lead to reduced road density or number of roads, although Alternative A only identifies roads for closure on a case-by-case basis. Decreased road density would be a long-term beneficial impact to wildlife by increasing vegetative cover and reducing contrast with the landscape, which, by reason of the linear nature of roads, are a strong to moderate contrast with line, color, and texture. Road designation under Alternative A has not been fully implemented, in part because designations have been difficult to enforce with the presence of intermingled private land. Therefore, there has been some degree of road proliferation, which adversely impacts wildlife and scenic values.

Alternative A opens the ACEC to over-snow vehicle travel regardless of snow depth, which would result in an adverse impact by stressing wildlife at a time of the year when they are most vulnerable. Over-snow vehicle travel can remove vegetation and compact soil if there is not enough snow cover. Over-snow vehicles used to collect antlers bring vehicles close to elk populations, and could also result in use that disturbs or harasses the animals. Because the ACEC value is for wintering big game, adverse impacts from over-snow vehicles would be substantial.

4.7.5.3.2.3.4. Special Designations

Under Alternative A, the Baldwin Creek Unit is managed as eligible for inclusion in the NWSRS to maintain its free flowing character, which complements management of ACEC values by limiting surface disturbance around it and restricting development that would change its wild and scenic character.

4.7.5.3.2.4. Alternative B

4.7.5.3.2.4.1. Program Management

Alternative B designates the same amount of acres on the Lander Slope as an ACEC as Alternative A. Alternative B resource protections and limits on surface disturbances for a wide variety of resource uses would result in substantial beneficial impacts to ACEC values. Alternative B closes the ACEC to all mineral development and major ROWs, which would result in more beneficial impacts than the less restrictive management under Alternative A.

4.7.5.3.2.4.2. Resources

Management of air quality, soil, and water under Alternative B would benefit ACEC wildlife and visual resources by limiting erosion and fugitive dust. Alternative B would close more acres to surface disturbance than Alternative A. Alternative B would implement a more proactive approach to reduce emissions and improve air quality, which could improve the view of the ACEC from surrounding communities. Compared to Alternative A, Alternative B includes more restrictive management of activities that could degrade water quality as well as limit surface disturbance.

Following a fire or a timber sale, Alternative B would result in more beneficial impacts to forest resources than Alternative A because Alternative B mandates forest replanting. Alternative B management to protect forest health from insect and disease outbreak would likely result in more short-term adverse impacts than Alternative A because under Alternative B, treatment would be attempted solely to protect human health and safety. The short-term loss of forest health would result in a short-term adverse impact to wildlife habitat and could result in reduced visual resource values. Under Alternative B management, a landscape-level fire could result in long-term adverse impacts to visual resources and wildlife.

Alternative B grassland and shrubland management would have the same beneficial impacts to wildlife as Alternative A. Closing the Baldwin Creek climbing area and access trail to forest product removal would result in more beneficial impacts than under Alternative A.

Although all alternatives would utilize an integrated approach to the management of INNS, an identified problem in the Lander Slope ACEC, INNS management would require more fire and mechanical treatment under Alternative B because of limitations on the use of chemicals in known aquifer recharge areas, which includes much of the ACEC. While this management would be more protective of water quality, it could reduce the acres treated and could result in loss of native vegetation that cannot compete against INNS. Alternative B has the potential to result in more beneficial impacts to vegetation by allowing the Authorized Officer to require livestock flushing before they are turned out on the public lands if it appears they have ingested INNS feed. Alternative B is also more proactive in addressing the link between BLM-permitted activities and the spread of INNS, which should result in a long-term beneficial impact to vegetation, and therefore wildlife.

Wildlife management under Alternative B would result in more beneficial impacts to the Lander Slope ACEC values than Alternative A. Under Alternative B, livestock forage is adjusted as needed to meet big-game herd objectives, and vegetation management emphasizes wildlife needs. Alternative B would remove some existing fences and would not authorize new fences on public lands. Alternative B road closures to benefit wildlife would result in a long-term beneficial impact to ACEC wildlife values. However, the closures are not anticipated to result in any short-term benefits. Sage-grouse management buffers leks with a larger buffer than in Alternative A, which increases the areas closed to surface disturbance in the greater sage-grouse Core Area.

Alternative B would protect visual resources more than Alternative A because Alternative B manages all of the ACEC as VRM Class II, which restricts more surface disturbances than in the portions of the ACEC managed as VRM Class III under Alternative A. Alternative B manages visual resources on the NWSRS-eligible segment as VRM Class I, which would be a beneficial impact. Visual and wildlife resources would benefit from the BLM pursuit of conservation easements on lands adjoining the ACEC to limit surface disturbance around the ACEC and within its viewshed.

4.7.5.3.2.4.3. Resource Uses

Mineral management under Alternative B is more protective of ACEC values than under Alternative A. Alternative B would have the fewest adverse impacts to the resources of concern because it precludes development of all leasable and salable minerals, whereas alternatives A and D only preclude surface use for fluid mineral development and associated disturbance such as utilities and roads required to support NSO development. The beneficial impact of this management would clarify to the public that these types of surface disturbances are precluded rather than the less clear direction of Alternative A, which leaves open the possibility of mineral development.

Alternative B management of wind-energy development and major ROWs and corridors would be markedly more beneficial to ACEC values than Alternative A management because Alternative B manages the ACEC as an exclusion area for these realty actions. Excluding major ROWs would beneficially impact both habitat and visual resources in the ACEC.

Livestock grazing management under Alternative B would result in fewer adverse impacts to ACEC values than under Alternative A because Alternative B manages grazing for rangeland health by reducing livestock use of vegetation to light utilization. In addition, rangeland infrastructure would not be authorized, although this would also preclude using fences to improve riparian-wetland areas. Alternative B could use the funds Alternative A would spend on range improvement projects for vegetation treatments to improve rangeland health with both short- and long-term beneficial impacts. However, while fencing of BLM-administered lands would not increase beyond current amounts and could be reduced, it is likely that fencing on private lands would increase to meet light utilization rates. It is not possible to estimate the extent to which such private fencing would increase (much of the private land in the ACEC is already fenced), but fencing would generally adversely impact both wildlife and visual resources.

Alternative B would close the Bus @ Baldwin Creek and Sinks Canyon climbing areas to motorized vehicle use, even on designated roads, therefore avoiding conflicts between motorized vehicle use and wildlife on less than 10 miles of roads. However, the increased use of these two areas by those seeking a nonmotorized type of recreational experience could offset decreased use by motorized vehicles. It is not possible to analyze these different impacts because recreational use would most likely occur outside of the winter season when wildlife is most likely to be present.

Outside of the two RMZs, travel management under Alternative B would result in more beneficial impacts to wildlife and scenic values than Alternative A. Although Alternative A limits travel to designated roads and trails with seasonal restrictions, this management has not been implemented in a way that can be enforced. Designation of roads and trails under Alternative B would be followed with implementation-level planning, which would deter user-created routes and unauthorized road expansions that have been allowed to proliferate under current management (Alternative A).

Over-snow motorized use is prohibited under Alternative B, which would be substantially more beneficial to wildlife than the open use under Alternative A, particularly because of the importance of the ACEC as a big-game winter concentration area. This management would also avoid adverse impacts to visual and cultural resources caused by travel that degrades vegetation and artifacts under the snow.

4.7.5.3.2.4.4. Special Designations

Alternative B manages more segments for inclusion in the NWSRS with more protective measures to maintain their ORVs, which would result in more beneficial impacts to the ACEC because of additional limits on surface disturbance.

4.7.5.3.2.5. Alternative C

4.7.5.3.2.5.1. Program Management

Alternative C designates no portion of the Lander Slope area as an ACEC. Instead, the area would be managed with standard prescriptions such as limits on disturbance based on slope and distance from riparian-wetland areas. Alternative C favors resource use and in general offers fewer protections to wildlife and scenic resources. Therefore, it would result in more adverse impacts to ACEC values than Alternative A or B. The following analyzes the impacts from management actions for the area designated as an ACEC under alternatives A, B, and D.

4.7.5.3.2.5.2. Resources

Alternative C would not proactively manage air quality like Alternative B, and similar to Alternative A manages soil and water resources with standard stipulations of closing only slopes greater than 25 percent. Alternative C waives these setbacks if a shorter distance is adequate. This somewhat less stringent management would result in adverse impacts to ACEC values.

Clear-cuts are allowed under Alternative C and can be within 100 feet of riparian-wetland areas and on slopes up to 45 percent. This difference from Alternative B might not be meaningful if there is no change in the local demand for timber/biomass. Fuels treatment and fire management impacts would be similar to Alternative B, except that Alternative C could result in more beneficial impacts because it does not limit chemical treatment. Similar to Alternative B, Alternative C would close the Baldwin Creek climbing area and access trail to forest product removal to prevent adverse impacts to visual resources.

Shrubland and grassland management under Alternative C would be less beneficial to ACEC wildlife because it emphasizes forage production for all grazing animals and not for wildlife as under Alternative B. Vegetative treatments would also emphasize forage production under Alternative C, not ecological diversity or wildlife needs. Riparian-wetland protections are the same as Alternative A with the same moderate beneficial impacts to intact wildlife habitat and visual resources, but less than under Alternative B's greater buffer.

Alternative C would increase areas open to surface disturbance in comparison to Alternative B with the potential for more adverse impacts. Although no additional roads are contemplated under any alternative, the additional acres open to major ROWs and realty actions and the larger area available for surface disturbance under Alternative C would increase the likelihood of INNS infestation. Under Alternative C, all available funds would be utilized for range improvement projects. This would result in fewer beneficial impacts to ACEC values than Alternative B, because Alternative B would have more vegetative treatments.

Alternative C wildlife management would result in more adverse impacts to wildlife than under Alternative B. This would also adversely impact big game concentrated in the ACEC. Alternative C has the same buffer as Alternative A, which closes substantially less acres to surface disturbance than Alternative B. Alternative C does not limit habitat fragmentation or increase vegetation by closing roads or limiting the footprint of projects, which would adversely impact wildlife. Alternative C does not apply seasonal restrictions to oil and gas O&M actions, therefore, there would be adverse impacts to wildlife during important seasons in their life-cycles due to disruptions from O&M actions. Because the Lander Slope ACEC is open to oil and gas development, O&M activities can occur year-round, despite adverse impacts to wildlife. The *Biological Resources* section describes these impacts to wildlife in more detail.

VRM under Alternative C allows more surface disturbance because the ACEC is managed as Class III and Class IV. This would result in greater adverse impacts to ACEC values than Alternative B, because substantially more development would meet this VRM Class and result in more adverse impacts to ACEC visual resources. ACEC key observation points, which include all of the City of Lander and its surrounding areas, are from a subordinate position, which would increase the contrast of any development.

4.7.5.3.2.5.3. Resource Uses

Alternative C opens the ACEC to mineral leasing and disposal with standard slope and riparian-wetland stipulations. Adverse impacts from surface oil and gas operations would likely be minimal because the potential for the presence of oil and gas is low. However, early oil exploration has resulted in adverse impacts to visual resources in the ACEC that are still visible.

Alternative C allows geophysical exploration, which would result in adverse short-term impacts to wildlife and visual resources due to vegetation and soil compaction. Long-term adverse impacts are not anticipated.

Alternative C would result in substantially more adverse impacts to visual and wildlife resources because it opens the ACEC to surface mining of phosphate. There are phosphate resources on 8,175 acres of the ACEC. The location of mineralization is on the portion of the ACEC easily visible from the surrounding communities and, particularly, the residences in the foothills. Surface mining of phosphate would remove all vegetation and overburden and create a pit to a depth necessary to obtain all of the minerals (approximately 300 to 400 feet). As with the iron mine on Route 28 through the South Pass area, phosphate mines would be visible from most observation points in the surrounding communities. The ACEC would be lost as winter habitat for the big game that concentrate in the area, with a resulting loss of herd numbers that would likely be irreversible. This would be both a short- and long-term adverse impact to wildlife.

Management of major ROWs and corridors, including wind-energy development and transmission lines and minor ROWs, under Alternative C, would result in substantially more adverse impacts to visual resources than Alternative B, which excludes these developments. Portions of the ACEC have high potential for wind-energy development. Industrial wind-energy development assumes approximately 5 turbines of at least 450 feet in height per section, plus roads, pads, structures, and transmission lines. Adverse impacts to ACEC visual resources from wind-energy development would result in a much more industrial backdrop to Lander and its foothills. It is likely that the loss of big game winter concentration habitat would be permanent.

Alternative C would include major ROWs in the ACEC. The demand for ROWs in the ACEC cannot be determined because, for the last quarter century, the Lander Slope has been an avoidance area for major ROWs. However, the ACEC and adjoining lands have high potential for wind energy, development which is allowed under Alternative C, but prohibited under Alternative B. By allowing major ROWs, Alternative C would facilitate wind-energy development, not just on BLM-administered lands, but on the adjoining Shoshone National Forest, which is not protected by wilderness designation. Development of wind energy has been limited because locating transmission lines on adjoining lands has not been allowed under ACEC management since 1987, which avoided the ACEC. Transmission lines allowed under Alternative C would have the potential to adversely impact visual resources and wildlife values in the same way as industrial wind-energy development.

Livestock grazing management under Alternative C would result in adverse impacts to ACEC values similar to Alternative A. Alternative C would allow higher utilization rates, which would reduce the vegetation available to wildlife, and make progress toward rangeland health through additional infrastructure, including water developments and fencing (see the discussion in the *Biological Resources* section). It is not possible to determine how much additional fencing is needed or would be constructed because some of the private land in the ACEC is already fenced.

Alternative C would result in impacts to vegetation and wildlife in the Bus @ Baldwin Creek and Sinks Canyon climbing areas similar to Alternative A. These impacts would be more adverse than impacts under Alternative B because Alternative C allows mechanized cross-country travel, resulting in impacts to vegetation. The impacts are difficult to assess because increased recreation management focusing on the Bus @ Baldwin Creek under Alternative B could increase use, thus increasing adverse impacts to wildlife from human activity. Other recreation management in the

ACEC under Alternative C focuses on maintaining the safety of recreationists and reducing conflicts which would not beneficially impact values of concern.

Alternative C limits travel to existing roads and trails, which would result in more adverse impacts to ACEC values than the Alternative B limits to designated roads and trails. Alternative C management of impacts from over-snow vehicles would be the same as Alternative A, and more adverse to wildlife than Alternative B.

4.7.5.3.2.5.4. Special Designations

In addition to not managing the area as an ACEC, management of the Baldwin Creek and North Fork waterway segments under Alternative C would not preclude adverse impacts to the area's wildlife and visual resources. In contrast to the other alternatives, Alternative C does not specially manage the NWSRS-eligible segments in the ACEC as VRM Class I. Alternative C allows water diversion projects, even if there would be adverse impacts to the segments.

4.7.5.3.2.6. Alternative D

4.7.5.3.2.6.1. Program Management

Alternative D designates the same area on the Lander Slope as an ACEC as alternatives A and B. Its management is similar to Alternative B with somewhat more beneficial impacts than Alternative A, and fewer adverse impacts than Alternative C.

4.7.5.3.2.6.2. Resources

Alternative D management of air quality, soil, and water would beneficially impact wildlife and visual resources in the Lander Slope ACEC by limiting erosion and fugitive dust. Alternative D closes the same number of acres to surface disturbance for a riparian-wetland buffer as alternatives A and C, and approximately 50 percent less than Alternative B. Alternative D implements the same approach to emissions and air quality as alternatives A and C, which would result in more adverse impacts to the view of the ACEC from the surrounding communities than under Alternative B.

Alternative D would include more restrictive management of activities that could degrade water quality than Alternative A or Alternative C, which would reduce surface disturbance and thus benefit ACEC values of concern. Following a fire or a timber sale, Alternative D, like Alternative A, would be less beneficial to forest resources than Alternative B or C because Alternative D mandates forest replanting only after it is determined that natural processes would not result in regeneration. It is not possible to determine how much less beneficial this impact would be, because forest product sales would not be likely under any alternative, and all alternatives allow full fire suppression.

Alternative D management to protect forest health from insect and disease outbreak would be similar to Alternative A and less likely to result in short-term adverse impacts than Alternative B, which provides that treatment be attempted only to protect human health and safety. The short- and long-term impacts of case-by-case management under alternatives A and D cannot be quantified, but this management would likely result in fewer adverse impacts than Alternative B or Alternative C because it offers more management flexibility in vegetative treatments that meet the VRM objectives of the ACEC. In the long term, it is expected that this treatment would help to maintain visual resources and avoid landscape-level fires that would result in long-term adverse impacts to wildlife habitat and reduce the value of visual resources. In the long term, Alternative D would result in similar beneficial impacts to forest life-cycle by allowing natural processes to be reestablished, but this benefit would not be evident during the planning period. Landscape-level fire could result in long-term adverse impacts to visual resources and wildlife in the ACEC.

Alternative D would manage grassland and shrubland communities to support a diversity of wildlife, and close the Baldwin Creek climbing area and access trail to forest product removal. These actions would result in beneficial impacts to wildlife in the Lander Slope ACEC. This management is similar to alternatives A and B, and would result in similar beneficial impacts to ACEC values. Alternative C would result in more adverse impacts by managing for livestock production.

Although all alternatives use an integrated approach to the management of INNS, INNS management would require more fire and mechanical treatment under Alternative D because of limitations on the use of chemicals in known aquifer recharge areas, which includes much of the ACEC, although chemicals may be used if no other treatment is effective. While this management is more protective of water quality, it could reduce the acres of treatment and could result in the loss of native vegetation that cannot compete with INNS. This management is similar to, but less restrictive than Alternative B. Alternative D could result in beneficial impacts to vegetation by allowing the Authorized Officer to require livestock flushing before they are turned out on the public lands if it appears that they have ingested INNS feed. Alternative D is also more proactive in addressing the link between BLM-permitted activities and the spread of invasive plant species, which should result in a long-term beneficial impact to vegetation and, therefore, wildlife.

The presence of invasive plant species would adversely impact visual resources, not only because of the different appearance of invasive plant species than native vegetation, but because of the more intense fire regimes associated with heavy invasive plant species infestations and the resulting adverse impacts to visual resources.

Wildlife management under Alternative D would result in more beneficial impacts to ACEC wildlife values than alternatives A and C, but fewer than Alternative B. The acres closed to surface disturbance around sage-grouse leks is the same as Alternative B in the Core Area but less outside of the Core Area. Alternative D is the same as Alternative A with regard to authorizing roads, which would result in more adverse impacts than Alternative B, which closes the ACEC to new roads for wildlife protections and also includes more proactive road closures of redundant roads to reduce adverse impacts to habitat. It is not clear how different the impacts would be because no alternative assumes new roads in the area. However, with the trend toward subdividing private lands near or adjoining the ACEC (see the *Cumulative Impacts* section) the difference could increase in importance over time.

As under Alternative A, Alternative D manages forage and adjusts livestock utilization rates as needed to meet big game herd objectives, and manages vegetation to emphasize wildlife needs. This would result in impacts similar to but possibly less beneficial to Lander Slope ACEC wildlife than Alternative B. Alternatives A and D would result in more beneficial impacts than Alternative C, which emphasizes livestock use over wildlife values and does not limit roads or fences. Alternative D would remove some existing fences and would not approve new fences so as to avoid habitat fragmentation and migration (see *Resource Uses* for livestock grazing below), an important beneficial impact to ACEC wildlife and visual resources. Alternative D road closures to benefit wildlife would result in a long-term beneficial impact to ACEC wildlife and resource values. However, road closures are not anticipated to result in any short-term beneficial impacts.

Alternatives B and D would protect visual resources more than Alternative A, because they manage all of the ACEC as VRM Class II (except for the WSR segments that are Class I). This would restrict more development, particularly ones that would be highly visible. Visual and wildlife resources under Alternative D would benefit from the BLM pursuit of conservation easements on lands adjoining the Lander Slope ACEC to limit surface disturbance.

4.7.5.3.2.6.3. Resource Uses

Leasable and mineral material management would result in more beneficial impacts to Lander Slope ACEC values under Alternative D than under Alternative A, but fewer beneficial impacts than under Alternative B. Similar to Alternative B, Alternative D would close the ACEC to phosphate leasing, mineral materials disposals, and geophysical exploration. Similar to Alternative A, Alternative D applies NSO restrictions for oil and gas development in the ACEC, which would result in fewer beneficial impacts compared to the leasing closure under Alternative B. The most notable difference between alternatives A and D and Alternative B is in the locatable mineral program; neither Alternative A nor D proposes to withdraw any areas in the ACEC, whereas Alternative B proposes to withdraw the entire ACEC. The actual adverse impacts of this difference is unclear, because the mineral resources present are primarily phosphate rather than any locatable minerals. As discussed for Alternative B, closure to phosphate leasing is a stronger protection than the limits under Alternative A. Therefore, Alternative D would result in more beneficial impacts to ACEC values than Alternative A.

In all mineral actions, Alternative C would result in the most adverse impacts to Lander Slope ACEC values of all the alternatives because it manages mineral actions with standard stipulations that allow surface disturbance for oil and gas and phosphate extraction. See the discussion under Alternative A regarding the adverse impacts that would likely result to both the ACEC wildlife and visual resources from phosphate mining.

Management of wind-energy development and major ROWs and corridors under Alternative D would result in more beneficial impacts to ACEC values than Alternative A, because Alternative D closes the Lander Slope ACEC to these actions, whereas Alternative A merely avoids them. This management would result in the same beneficial impacts as Alternative B, and would avoid the adverse impacts discussed under Alternative C. Even if no other route is available, the realty action would be denied and surface disturbance prevented under Alternative D.

Livestock grazing management under Alternative D would result in fewer adverse impacts to Lander Slope ACEC values than under Alternative A because Alternative D allows range improvement projects only if their purpose is to enhance ACEC values. This would likely result in more beneficial impacts to wildlife than Alternative B, which prohibits range improvements of any kind. Alternative D would result in more beneficial impacts than Alternative A, which allows range improvement projects that are not for the benefit of wildlife. Alternative C would result in many more adverse impacts as this alternative would not limit range improvement projects, because it does not emphasize protecting wildlife and visual resources.

Livestock utilization levels under Alternative D are the same as under alternatives A and C. However, like Alternative B, Alternative D protects wildlife forage resources. This would avoid the adverse impacts under Alternative C, which has higher utilization levels and does not have wildlife forage protection as an objective.

Similar to Alternative B, Alternative D closes the Bus @ Baldwin Creek and Sinks Canyon climbing areas to motorized vehicle use, even on designated roads, thus avoiding conflicts between motorized vehicle use and wildlife in these areas. However, the increased use of these two areas by those seeking a nonmotorized type of recreational experience could offset decreased use by motorized vehicles. It is not possible to analyze the differences in impacts because the elk and mule deer that use these areas for winter habitat would likely be concentrated at the higher elevations in the Shoshone National Forest during the seasons when recreational use is highest. Compared to alternatives A and C, Alternative D is more protective of vegetation and soils and better avoids fragmentation by limiting mechanized use such as bicycles to designated roads, and closing 1,298 acres from cross-country nonmotorized use.

Outside the two RMZs, travel management under Alternative D would be more beneficial to wildlife and scenic values than Alternative A. Although Alternative A limits travel to designated roads and trails with seasonal restrictions, this management has not been implemented in a way that can be enforced.

Alternative D allows over-snow motorized travel (as opposed to Alternative B, which prohibits over-snow travel), but Alternative D would avoid potentially adverse impacts to soils and vegetation that could occur under alternatives A and C because Alternative D requires that motorized over-snow vehicles comply with standard travel management (designated roads and trails) unless there are at least 12 inches of snow. While this would not result in the same beneficial impacts as Alternative B's avoidance of conflicts between wildlife and motorized vehicles, Alternative D would avoid adverse impacts to visual and cultural resources caused by travel that degrades vegetation and artifacts under the snow.

4.7.5.3.2.6.4. Special Designations

Alternative D would manage NWSRS-eligible segments along Baldwin Creek as suitable for inclusion in the NWSRS, but not the North Fork of the Popo Agie, as under Alternative B. Alternative D limits surface disturbance and thus would result in more beneficial impacts to ACEC values than Alternative C, which would not specially manage any part of the ACEC as suitable for WSR designation.

4.7.5.3.3. Detailed Analysis of Alternatives – Red Canyon

4.7.5.3.3.1. Summary of Impacts

Alternatives A, B, and D would designate 15,109 acres as an ACEC to protect big game winter range and scenic views. Alternative C does not designate the area as an ACEC and manages it with standard stipulations.

Alternative C would result in the most adverse impacts to ACEC values because it manages the area with standard stipulations which would not preclude surface disturbance that would adversely impact wildlife and viewshed. Alternatives A and D have very similar management and similar impacts, except that Alternative A may be somewhat more adverse because prescriptions avoid, but do not explicitly prohibit potentially adverse actions such as phosphate leasing. Alternative B would result in the fewest adverse impacts because the area is closed to oil and gas leasing and not just NSO as with alternatives A and D.

Alternative B would have the most beneficial impacts because resources are emphasized over resource uses. Wildlife protections would be the most beneficial under Alternative B because VRM limits the most visual intrusions. Alternative D would have the next most beneficial impacts. Like Alternative B, VRM restricts development. Mineral management would be less beneficial in that the area would be open to oil and gas development subject to NSO, rather than closed, and the area would not be withdrawn from locatable mineral entry. Since there is low potential, this difference in impact may be small. Alternative A would have similar impacts, although the ACEC would only be avoided and not excluded to major ROWs, and open to phosphate leasing with surface restrictions rather than closed. Since the Lander Slope has phosphate potential, this difference from alternatives B and D may be moderate or less beneficial. Alternative C would have the fewest beneficial impacts because VRM would allow more adverse intrusions and oil and gas development is not limited. ROWs might adversely impact both viewshed and habitat since they are not prescribed except by slope and riparian-wetland areas.

4.7.5.3.3.2. Impacts Common to All Alternatives

The view of Red Canyon from Highway 28 and surrounding areas is considered one of the most iconic views in Wyoming. Its prominence means that surface disturbance would be highly visible and present a strong contrast with undisturbed areas. Red Canyon is also crucial winter big game habitat where elk, that roam the Shoshone National Forest in the summer, concentrate to take advantage of the broad, windswept slopes in the ACEC.

Under all alternatives limitations on surface disturbance would result in beneficial impacts to Red Canyon ACEC values, including viewshed and elk habitat. Conversely, surface disturbance would adversely impact ACEC values. Since the ACEC is an important elk habitat, the degree of impact, including the frequency and amount of human presence, is also a factor beyond the mere loss of vegetation as elk are wary of human activity. All alternatives would maintain forage for 500 elk.

All alternatives identify the Red Canyon ACEC as an area in which to use full suppression fire. In all cases, fuels treatment is responsive to the concerns of the many private landowners in the WUI who desire the beneficial impacts to visual resources of junipers against the red rocks. Fuels treatment objectives are the same under all alternatives although the alternatives vary in the amount of the planning area that would be treated each year.

All alternatives manage the NNL portion of the ACEC as VRM Class I, which preserves the existing character of the landscape from development. VRM of the rest of the ACEC (approximately 13,004 acres) varies by alternative.

The alternatives vary in their management of forest resources and the use of clear-cuts as silviculture techniques. However, there would likely be little difference in impacts from the different management because of the very low demand for saw timber.

Although the alternatives vary in the locatable minerals management, there would be no difference in impacts because no locatable mineral potential has been identified, so no impacts can be analyzed.

All alternatives would allow livestock grazing in the Red Canyon ACEC.

None of the alternatives manage waterway segments in the ACEC as eligible or suitable for inclusion in the NWSRS.

4.7.5.3.3.3. Alternative A

4.7.5.3.3.3.1. Program Management

The 1987 RMP and EIS ROD designated Red Canyon as an ACEC for wildlife (elk) and scenic values (see the Lander ACEC Report [BLM 2010f] for detailed discussion of these values). Management actions for the benefit of wildlife benefit elk that winter in the ACEC but migrate to the surrounding mountainous areas. Limitations on surface disturbance would benefit ACEC wildlife and visual resources. Vegetation would be managed to provide forage for a population of 500 elk.

4.7.5.3.3.3.2. Resources

Air quality, soil, and water management under Alternative A, with standard stipulations, would result in beneficial impacts to ACEC values by limiting surface disturbance. Forest management could result in adverse impacts to ACEC values but these impacts are unlikely to occur. Alternative A includes vegetative treatments in the Red Canyon ACEC for the benefit of wildlife forage. These treatments would result in short- and long-term beneficial impacts to wildlife habitat by contributing to vegetative diversity and preventing INNS encroachment. However, mechanical vegetative treatments would result in a short-term adverse impact to visual resources, which could be mitigated by careful feathering of the edges.

Wildlife management under Alternative A would generally benefit ACEC values, including seasonal travel closures to protect large concentrations of wintering big game and the maintenance of elk forage. Alternative A would result in limited protections for greater sage-grouse although 8,392 acres are in the Wyoming Governor's Core Area. Wildlife management under Alternative A does not prohibit fences, which would cause an adverse impact by removing vegetation, creating livestock concentration areas, fragmenting habitat, and impeding migration. Much of the Red Canyon ACEC wildlife migrates between winters in the ACEC and summer habitat in the Shoshone National Forest, so fences result in an important adverse impact. However fences can also improve riparian-wetland areas resulting in a long-term benefit to the elk if the fences are ultimately removed and livestock grazing in the riparian-wetland area is appropriately managed. Buffers around sage-grouse leks benefit ACEC values by limiting surface disturbance.

VRM under Alternative A would benefit visual resources in the ACEC by retaining the existing character of the landscape within and adjacent to the ACEC with Class II management, which allows activities that can be seen but do not attract the attention of the casual observer. This management limits surface-disturbing activities, which would beneficially impact both wildlife and visual resources.

4.7.5.3.3.3.3. Resource Uses

Alternative A oil and gas management in the Red Canyon ACEC is subject to NSO restrictions, which would limit loss of vegetation and avoids habitat fragmentation and degradation of visual resources. Alternative A would not withdraw the ACEC from locatable mineral entry, but there is no identified potential for locatable minerals in the ACEC. A Plan of Operations would be required for small mining disturbances.

Alternative A would not close the ACEC to phosphate leasing, but restricts phosphate recovery to protect sensitive visual resources and crucial wildlife habitat. In the absence of an explicit prohibition on surface occupancy for phosphate mines, any proposal for a lease would require analysis of potential impacts, which would include stripping of all vegetation and overburden and surface removal of the phosphate (strip mining). It is likely, but not mandated, that leases would be denied because damages to the area would be visible from the surrounding areas and would have the potential to threaten elk herds. Under Alternative A, there are no limits on phosphate recovery in adjoining areas visible from the ACEC or utilized by elk for migration. Both the ACEC and adjoining lands have phosphate potential.

Alternative A does not close the ACEC to mineral materials disposal, which would prevent adverse impacts to wildlife and visual resources. However, any proposals for material disposals would be assessed on a case-by-case basis to avoid adverse impacts to values of concern.

Alternative A avoidance of the ACEC for major ROWs and corridors would result in adverse impacts to ACEC values should disturbances occur. ROWs are not excluded under Alternative A, if there was no alternative location for an ROW, it would be authorized. No such ROW potential or demand has been forecast under current management because of avoidance of both Red Canyon and the Lander Slope since 1987. However, if private lands or Shoshone National Forest lands were developed for wind energy, it is unlikely that transmission lines could avoid the ACEC.

Under Alternative A, recreation management in the ACEC would support ACEC values. There are no RMZs in the ACEC. Alternative A closes the ACEC to over-snow vehicle travel and winter sport activities to protect elk in the ACEC. Motorized travel is limited to designated roads and trails but has been managed as limited to existing roads and trails, a more adverse management that allows the use of more existing roads and trails.

4.7.5.3.3.3.4. Special Designations

Under Alternative A, the Little Popo Agie River is managed to maintain its free flowing and outstanding characteristics which would beneficially impact ACEC values by limiting surface disturbance.

4.7.5.3.3.4. Alternative B

4.7.5.3.3.4.1. Program Management

Alternative B is more protective of wildlife and visual resources than Alternative A. Management would limit or prohibit substantially more mineral resource development and limit livestock grazing to light rather than moderate as under Alternative A. Alternative B designates the same area as an ACEC as Alternative A, but with more restrictive management of activities allowed in the ACEC.

4.7.5.3.3.4.2. Resources

Management of air quality, soil, and water resources under Alternative B would benefit wildlife and visual resources by limiting erosion and fugitive dust to a greater extent than Alternative A.

Alternative B implements a more proactive approach to reduce emissions and improve air quality, which could improve the view of the ACEC from Highway 28.

Following a fire or a timber sale, Alternative B would result in more beneficial impacts to forest resources in the ACEC than Alternative A, because Alternative B mandates forest replanting. The impact of this management cannot be analyzed because forest sales would not be likely under any alternative, and full fire suppression would be allowed under all alternatives. Alternative B management of insect and disease outbreaks likely would result in more short-term adverse impacts than Alternative A, because treatment would be implemented only to protect human health and safety. This short-term loss of forest health would result in a short-term adverse impact to wildlife habitat and could result in reduced visual resource values. Alternative B fuels management would result in impacts similar to Alternative A, but perhaps more beneficial because more areas would be treated (see below under livestock grazing management).

Alternative B manages grassland and shrubland communities to support a diversity of wildlife and game, which would result in a more beneficial impact to wildlife than Alternative A. Alternative B maintains forage for 500 elk, similar to Alternative A.

Alternative B has the potential to result in more beneficial impacts to vegetation than Alternative A because Alternative B is also more proactive in addressing the link between BLM-permitted activities and the spread of INNS. The presence of invasive plant species also adversely impacts visual resources, not only because of the different appearance of invasive plant species than native vegetation, but also because of the more intense fire regimes associated with heavy invasive plant species infestation and the resulting adverse impacts to visual resources.

Wildlife management under Alternative B is more protective of ACEC wildlife values than Alternative A. Livestock forage would be adjusted as needed to support elk forage and vegetation management would emphasize wildlife needs. Alternative B does not allow new fences and could remove some existing fences to improve animal movement. Visual resources management under Alternative B is the same as Alternative A, and impacts would be similar. Sage-grouse management buffers leks with a larger buffer than in Alternative A, which increases the acres closed to surface disturbance.

4.7.5.3.3.4.3. Resource Uses

Leasable and mineral materials management under Alternative B would be more protective of ACEC values than Alternative A. Alternative B would close the ACEC to phosphate and all mineral leasing and all mineral materials disposals.

Management of wind-energy development and major ROWs and corridors would be substantially more beneficial to ACEC values under Alternative B, because the alternative excludes these realty actions. Even if no other route was available, the realty action would be denied under Alternative B thus avoiding the potentially serious adverse impacts to ACEC values under Alternative A.

Livestock grazing management under Alternative B would result in fewer adverse impacts to ACEC values than Alternative A, because Alternative B manages grazing for rangeland health by over time reducing utilization to light use and does not allow rangeland infrastructure. This management would slowly reduce adverse impacts to vegetation from the heavier Alternative A utilization, and would avoid livestock concentrations near water developments and fence lines. It is possible that these beneficial impacts to ACEC values would be offset, in some part, by the likelihood that light utilization could be achieved only by some additional fencing of private lands. Because livestock grazing objectives would be achieved by stocking rates and not infrastructure under Alternative B, triple the amount of acres planning area wide would receive vegetation treatments in comparison to Alternative A (1,500 acres per year versus 500 acres). It is likely that some of this additional vegetation treatment would occur in the ACEC.

Recreation management under Alternative B would be more protective of wildlife values because the alternative closes the ACEC to human presence in winter, rather than just closing it to sport activities and over-snow vehicles, which potentially could result in human activities that stress wintering elk. Alternative B limits travel management to designated roads and trails, with implementation-level planning to meet the management requirements. This would result in beneficial impacts to ACEC values, but the difference from Alternative A would be evident only over the long term.

4.7.5.3.3.4.4. Special Designations

Under Alternative B, the NWSRS-eligible segment on the Little Popo Agie River is recommended as suitable for inclusion in the NWSRS. Management prescriptions for the WSR are the same as for the remainder of the ACEC and would not result in additional beneficial or adverse impacts to the ACEC.

4.7.5.3.3.5. Alternative C

4.7.5.3.3.5.1. Program Management

Alternative C does not designate any portion of the Red Canyon as an ACEC. The area would be managed with standard stipulations and open to mineral development and ROWs. This management conforms to the overall emphasis on resource utilization under Alternative C. The Red Canyon NNL is managed as VRM Class I under all alternatives. Because this VRM classification would preclude almost all surface disturbance in the NNL, impacts to visual resources under Alternative C would be limited to the portion of the ACEC outside the NNL.

4.7.5.3.3.5.2. Resources

The Alternative C emphasis on resource uses over physical and biological resources would result in more adverse impacts to values of concern. Unlike Alternative B, but similar to Alternative A, Alternative C does not proactively manage air quality and manages soil and water resources with standard stipulations which can be waived if restrictions would be adequate to protect the resources. The less restrictive forest management than Alternative B might mean little if a local demand for timber/biomass products does not materialize. Fuels treatment and fire management impacts under Alternative C would be the same as under Alternative B, except for vegetation treatments discussed below under grazing. Grassland and shrubland management under Alternative C would be less beneficial to wildlife because it emphasizes forage production for all grazing animals and not, as under Alternative B, for elk and other wildlife.

More areas open to surface disturbance under Alternative C would also result in more adverse impacts to vegetation than Alternative B because the likelihood of INNS infestation increases with surface disturbance. The additional acres open to major ROWs and realty actions and the larger area available for surface disturbance under Alternative C would increase the likelihood of INNS infestation.

Alternative C wildlife management is similar to Alternative A and would be somewhat more adverse to ACEC values than Alternative B because forage allocations under Alternative C emphasize livestock grazing use rather than wildlife and Alternative C has the same sage-grouse buffer as Alternative A. Alternative C does not limit habitat fragmentation or increase vegetation by closing roads or limiting the footprint of projects. Although Alternative C does not apply seasonal protections from oil and gas O&M activities as does Alternative B, this would result in a minimal impact because there is very low potential for oil and gas in the ACEC. These impacts are described in more detail in the *Biological Resources* section.

Under Alternative C, VRM in the areas around the NNL would result in more adverse impacts to ACEC values than Alternative B, which manages the area outside the NNL with limited surface disturbance.

4.7.5.3.3.5.3. Resource Uses

Leasable mineral management under Alternative C allows activities that would result in more adverse impacts to ACEC values than Alternative A or B. Alternative C opens all of the ACEC to mineral leasing with surface occupancy. While the ACEC has a low potential for oil and gas, it does have extensive phosphate resources. Marked adverse impacts from phosphate development would be likely under Alternative C, including stripping of vegetation and overburden to reach the mineral resource (strip mining). The loss of habitat for elk that winter in the ACEC would be a serious adverse impact because elk are wary of human activities and would avoid the area. Because there is no readily available winter habitat for the large number of elk that summer in the Shoshone National Forest, phosphate mining in the Red Canyon ACEC would threaten the life of the herd. Major adverse impacts to visual resources would also be likely under Alternative C. The location of mineralization is on the portion of the ACEC easily visible from the surrounding communities, the scenic lookout along Highway 28, and particularly, the residences in the foothills. Surface mining of phosphate would remove all vegetation and create a pit to a depth necessary to obtain all of the minerals. As with the iron mine farther up Route 28, phosphate mines would be visible from most observation points in the surrounding communities.

Under Alternative C, geophysical exploration with resulting adverse impacts to wildlife and visual resources, due to vegetation and soil compaction, would be authorized. However, it is unlikely there will be much demand for geophysical exploration in light of the low potential for oil and gas. Impacts from geophysical exploration would likely be short-term.

Alternative C management of major ROWs and corridors, including wind-energy development and transmission lines, would result in substantially more adverse impacts to visual resources than Alternative B, which excludes these developments. Portions of the ACEC and adjoining lands, including private lands, have high potential for wind-energy development and Alternative C opens the ACEC to wind-energy development. This industrialization of the area would result in a substantial adverse impact to ACEC visual and wildlife resources in the short term and long term, with potential loss of the elk herd.

Livestock grazing management under Alternative C would result in impacts to ACEC values similar to Alternative A with slightly less beneficial impacts than Alternative B. See the *Biological Resources* section for more information on the impacts of livestock grazing on wildlife. Alternative C would result in increased infrastructure to concentrate livestock (which would adversely impact vegetation). Additionally, fences could fragment habitat and migration corridors. Impeding wildlife movement would adversely impact elk that winter in the ACEC and move to habitat in the Shoshone National Forest in summer. However, part of the adverse impact of additional infrastructure could be offset by the Alternative B potential increase in the numbers of fences on private lands to reduce livestock utilization. Vegetation treatment under Alternative C would be similar to Alternative A, with fewer beneficial impacts to vegetation and viewshed.

Alternative C recreation management would result in many more adverse impacts to wildlife than Alternative A or B, because Alternative C places no winter limitations on over-snow vehicles or sporting activities. This would stress the wintering elk population. There are no areas managed as RMZs under Alternative C. Impacts to the ACEC from travel management would be slightly more adverse under Alternative C and similar to impacts under Alternative A. These impacts are anticipated to be long-term.

4.7.5.3.3.5.4. Special Designations

Alternative C has no special designations other than the NNL that is common to all of the alternatives. There is no limit on development in the Little Popo Agie River.

4.7.5.3.3.6. Alternative D

4.7.5.3.3.6.1. Program Management

Alternative D designates the same ACEC area as alternatives A and B. Alternative D management of Red Canyon is similar to management under Alternative B, and would result in somewhat more beneficial impacts than Alternative A. Alternative D would be substantially more beneficial to ACEC values than Alternative C. Resource values are emphasized and resource uses are limited if adverse impacts to ACEC values would result.

4.7.5.3.3.6.2. Resources

Alternative D management of air quality, soil, and water would benefit wildlife and visual resources by limiting erosion and fugitive dust in a way that is similar to Alternative A. Alternative D includes more restrictive management of activities that could degrade water quality than Alternative A or C that would likely reduce surface disturbance. Following a fire or a timber sale, Alternative D, similar to Alternative A, would result in fewer beneficial impacts to forest resources in the Red Canyon ACEC than Alternative B or Alternative C, because Alternative D mandates forest replanting only after natural processes do not result in regeneration. Alternative D management to protect forest health from insect and disease outbreaks is the same as Alternative A, and would be less likely to result in short-term adverse impacts than Alternative B.

All alternatives use an IPM approach to INNS in the Red Canyon ACEC, although, under Alternative D chemical treatment is allowed only if other methods are not successful. While this could result in beneficial impacts to water quality similar to Alternative B, Alternative D would result in more adverse impacts by being less effective in treating INNS than alternatives A and C, which do not limit the use of chemical treatments. The presence of invasive plant species would adversely impact visual resources because of the different appearance of invasive plant species than native vegetation and the more intense fire regimes associated with heavy invasive plant species infestation.

Alternative D wildlife management would result in more beneficial impacts to Red Canyon ACEC wildlife values than Alternative A, substantially more than Alternative C, and similar impacts to Alternative B. Alternative D would limit surface disturbance in the 8,392 acres of the Core Area. Similar to Alternative B, Alternative D is more protective of visual resources in the Red Canyon ACEC than alternatives A and C because Alternative D would manage all of the ACEC as VRM Class II (other than the NNL, which would be managed under all alternatives as VRM Class I), which restricts more surface disturbance that would adversely impact wildlife and visual resources.

4.7.5.3.3.6.3. Resource Uses

Leasable and mineral materials management under Alternative D would result in more beneficial impacts to Red Canyon ACEC values than Alternative C, but somewhat fewer than Alternative B. Similar to Alternative B, Alternative D would close the ACEC to phosphate leasing, mineral materials disposals, and geophysical exploration. As under Alternative A, the Alternative D ACEC would manage oil and gas development with an NSO stipulation.

As discussed for Alternative B, the Alternative D closure to phosphate leasing would result in more beneficial impacts than the management prescriptions under Alternative A, which does not expressly close the ACEC to phosphate leasing. In this regard, Alternative D would result in the same beneficial impacts to the ACEC as Alternative B.

Alternative D management of wind-energy development and major ROWs and corridors, would result in more beneficial impacts to ACEC values than Alternative A, because Alternative D, like Alternative B, makes the ACEC an ROW exclusion area. Livestock grazing management under Alternative D would result in fewer adverse impacts to ACEC values than Alternative A, because Alternative D allows range improvement projects only if they would enhance ACEC values. This would result in more beneficial impacts to wildlife than Alternative B, which prohibits range improvements of any kind. Grazing utilization levels under Alternative D are the same as under alternatives A and C. Through out the planning area, range infrastructure would be built which would result in the same acres of vegetation treatment as alternatives A and C, and approximately one-third of Alternative B. If this results in fewer acres treated in the ACEC, it would adversely impact both habitat and visual resources.

Similar to Alternative B, Alternative D travel management would be more beneficial to wildlife and scenic values than Alternative A. Although Alternative A limits travel to designated roads and trails with seasonal restrictions, this management has not been implemented in a way that can be enforced. Alternative B and D travel designations are followed with implementation-level planning, which would deter user-created routes and unauthorized road expansions that have been allowed to proliferate under current management (Alternative A) or would continue under Alternative C.

Like alternatives A and B, Alternative D does not allow over-snow motorized vehicle use, which would result in a beneficial impact to elk and avoid adverse impacts that would occur under Alternative C. Although Alternative D includes a shorter closure period to human presence (allowing nonmotorized use such as hiking after April 30), this would not result in more adverse impacts than Alternative A or Alternative B, because motorized vehicle use in May and June is the primary activity that would adversely impact saturated soils and damage vegetation.

4.7.5.3.3.6.4. Special Designations

There are no special designations in the Red Canyon area under Alternative D, other than the ACEC designation. The Little Popo Agie is not specially managed.

4.7.5.3.4. Detailed Analysis of Alternatives – Dubois Badlands

4.7.5.3.4.1. Summary of Impacts

Alternatives A and B would designate 4,903 acres as an ACEC to protect fragile soils and scenic views. Alternative C does not designate the area as an ACEC and would manage it with standard stipulations. Alternative D adds 342 acres outside of the WSA to the East Fork ACEC and would not designate the remaining 4561 acres as an ACEC. Alternative D would manage the WSA in accordance with the IMP.

There is very little difference in impacts among the alternatives because of the WSA. The only area of difference is in the management of the 342 acres that are within an ACEC under alternatives A, B, and D (where the ACEC is East Fork), but managed in accordance with standard stipulations under Alternative C. Management of the WSA under all alternatives (including travel management) would be the same and impacts would be similar.

Alternative C would result in somewhat more adverse impacts because it has limited protections for the non-WSA portion of the ACEC. However, there are limited potential adverse impacts to these lands. Adverse impacts are not anticipated under alternatives A, B, or D.

Beneficial impacts from management would be similar among all four alternatives because of the WSA.

4.7.5.3.4.2. Impacts Common to All Alternatives

The Dubois Badlands provide prominent views along Highway 287 (the main route to Yellowstone and Grand Teton National Parks) and the town of Dubois. Extensive surface disturbance would be highly visible and present a strong contrast with undisturbed areas. The extremely erodible sandstone along the southern edge of the ACEC can tolerate almost no human disturbance. Consequently, any surface-disturbing activity would adversely impact sensitive soils and visual resources in the ACEC.

The majority of the Dubois Badlands ACEC, 93 percent, is managed under the IMP because it is located within a WSA. The more restrictive management (whether IMP or ACEC) would be applied. Under all alternatives, the WSA portion would be managed as VRM Class I and closed to motorized vehicle travel, with other protections against adverse impacts from surface disturbance, including mineral developments (see the *Wilderness Study Areas* section for more information). The practical effect of the WSA is that there is very little difference among the alternatives with regard to specific management actions.

All alternatives identify only the parts of the ACEC outside the WSA as areas in which full suppression fire management should be utilized, in accordance with the provisions of the IMP. The different management prescriptions under each alternative for forestry and silvicultural practices would not result in different impacts to ACEC values, because the area lacks forests and woodlands. There would not be any difference in INNS management impacts among the alternatives.

Notwithstanding the travel closure, unauthorized OHV use of the Dubois Badlands ACEC has resulted in substantial adverse impacts to the area by disturbing and compacting soils, and damaging or destroying vegetation. None of the alternatives include management that would reverse this damage during the planning period.

No locatable minerals have been identified as occurring in the Dubois Badlands ACEC. Therefore, although the alternatives vary in their locatable mineral management, there is not likely to be any difference in impacts among the alternatives as a result of this difference in management. Accordingly, locatable minerals are not further analyzed.

Although the alternatives vary in their ROW and realty management, the impacts of these differences would not vary by alternative, because it is not reasonable to assume there would be demand for ROWs outside of the WSA. Accordingly, ROWs, including wind-energy development, are not further discussed.

All alternatives manage the ACEC as open to livestock grazing, but vary in the use of funds for range improvement projects or increased vegetation treatment. However, since so much of the ACEC is under the provisions of the IMP, there is no meaningful difference among the alternatives in impacts from these differences. Similarly, the different motorized travel management outside the WSA, would result in no difference in impacts among alternatives.

4.7.5.3.4.3. Alternative A

4.7.5.3.4.3.1. Program Management

The 1987 RMP and EIS ROD designated the Dubois Badlands as an ACEC for sensitive soils and scenic values (see ACEC Report for detailed discussion of these values). Management actions from other programs that protect physical and biological values would avoid adverse impacts to ACEC visual resources and sensitive soils by limiting surface disturbance. Management that results in beneficial impacts to wildlife supports ACEC values.

4.7.5.3.4.3.2. Resources

Alternative A manages soil, water, and riparian-wetland values with standard stipulations, which would beneficially impact ACEC values. VRM management would beneficially impact visual resources and sensitive soils in the ACEC by limiting surface disturbance outside the WSA, and on lands adjacent to the ACEC with VRM Class II management.

4.7.5.3.4.3.3. Resource Uses

Oil and gas management in the ACEC outside the WSA is subject to an NSO restriction under Alternative A, which would limit vegetation loss, and avoid habitat fragmentation and adverse impacts to visual resources. Alternative A manages the ACEC as closed to mineral materials disposals, although no closure has been identified because of sensitive soils and the IMP, which would avoid adverse impacts to sensitive soils and visual resources. Alternative A would manage recreation as part of the planning area-wide ERMA, with no focus on visitor services to provide a recreational experience in the ACEC.

4.7.5.3.4.3.4. Special Designations

Alternative A does not include any other special designations in the area with the exception of the WSA, which is common to all alternatives.

4.7.5.3.4.4. Alternative B

4.7.5.3.4.4.1. Program Management

Alternative B designates the same number of acres as ACEC as Alternative A, but would increase management prescriptions for the benefit of the same values of concern.

4.7.5.3.4.4.2. Resources

Management of air quality, soil, and water resources under Alternative B, would reduce adverse impacts to sensitive soils and visual resources by reducing the amount of surface disturbance. Similar to Alternative A, Alternative B management would avoid adverse impacts to sensitive soils and visual resources. Visual resources management under Alternative B is the same as Alternative A, so impacts would be similar.

4.7.5.3.4.4.3. Resource Uses

Alternative B management of leasable and mineral materials is more protective of ACEC values outside the WSA than Alternative A, but the beneficial impacts are unlikely to differ from those impacts under Alternative A.

There is no special recreation management for the ACEC under Alternative B. However, recreation management would be more focused on protecting existing values from change, therefore, resulting in more beneficial impacts to ACEC values than Alternative A.

4.7.5.3.4.4.4. Special Designations

The WSA is a special designation within the Dubois Badlands ACEC.

4.7.5.3.4.5. Alternative C

4.7.5.3.4.5.1. Program Management

Alternative C does not designate any portion of the Dubois Badlands as an ACEC. Instead, the area outside the WSA would be managed with standard stipulations. Alternative C would result in the fewest beneficial impacts and the most adverse impacts to ACEC values of any alternative.

4.7.5.3.4.5.2. Resources

The Alternative C emphasis on resource uses over physical and biological resources would result in minimal impact to visual resources in the Dubois Badlands ACEC because development is limited by the IMP. For areas outside of the WSA, Alternative C management would be similar to Alternative A, with very minor differences in adverse impacts as identified under Alternative B.

Fuels treatment and fire management impacts under Alternative C would be similar to Alternative B, except to the limited extent that fewer vegetation treatments might be done in the area outside of the WSA, because available funds would be utilized for range infrastructure projects. This difference would not be expected to result in any noticeable difference in impacts to the ACEC.

VRM under Alternative C would be more adverse to Dubois Badlands ACEC values than under Alternative B for areas outside the WSA, because this alternative (VRM Class III) would allow more activities that would contrast with visual resources in the area, even if they would attract the attention of viewers.

4.7.5.3.4.5.3. Resource Uses

Alternative C management of leasable minerals would result in slightly more adverse impacts to Dubois Badlands ACEC values than Alternative A or B. Alternative C would open the non-WSA portions of the ACEC to leasing with surface occupancy for all mineral activities and allows geophysical exploration. However, it is not likely that the limited restrictions on minerals management under Alternative C would result in development, because the non-WSA portions of the ACEC have very low potential for minerals. Therefore, adverse impacts are anticipated to be similar to Alternative A or B during the planning period.

Alternative C limits travel to existing roads and trails outside the WSA, which would result in the potential for substantial adverse impacts to ACEC values. OHV usage in the area has caused resource damage in the past and introduced new “illegal” routes. Not designating travel to specific roads would reduce BLM's ability to enforce its travel management and would make it more difficult to prevent new user-created roads and trails. This difference in management could have increasingly greater long-term adverse impacts over time.

4.7.5.3.4.5.4. Special Designations

Alternative C does not include any special designations in the Dubois Badlands other that the WSA, which is common to all alternatives.

4.7.5.3.4.6. Alternative D

4.7.5.3.4.6.1. Program Management

Similar to Alternative C, Alternative D does not designate the Dubois Badlands as an ACEC. However, Alternative D designates the 342 acres outside the WSA, but within alternatives A and B ACEC boundaries, as part of the East Fork ACEC.

4.7.5.3.4.6.2. Resources

See the description of impacts to ACEC values from management of resources under Alternative D for the East Fork ACEC.

4.7.5.3.4.6.3. Resource Uses

See the description of impacts to ACEC values from management of resource uses under Alternative D for the East Fork ACEC.

4.7.5.3.4.6.4. Special Designations

There is no special designation management under Alternative D other than the WSA.

See the description of impacts to ACEC values from management of the non-WSA portions of the Dubois Badlands under Alternative D for the East Fork ACEC.

4.7.5.3.5. Detailed Analysis of Alternatives – Whiskey Mountain

4.7.5.3.5.1. Summary of Impacts

Alternatives A, B, and D, designate 8,776 acres as an ACEC to protect bighorn sheep habitat. Alternative C does not designate the area as an ACEC and would manage it with standard stipulations.

Alternative C has the most adverse impacts to ACEC values because it manages the area with standard stipulations which would not preclude surface disturbance that would adversely impact bighorn sheep. Alternative A has fewer adverse impacts because ROWs must avoid the area if possible and the area is withdrawn from locatable minerals. Alternative A manages oil and gas with NSO stipulations but this difference is only minor because the area has little to no potential. Alternatives B and D have very similar management and similar minor adverse impacts except that Alternative B closes the entire area to livestock grazing. However, Alternative D allows grazing in 2,164 acres which could adversely impact bighorn sheep by reducing forage availability.

4.7.5.3.5.2. Impacts Common to All Alternatives

Whiskey Mountain was designated as an ACEC in the 1987 RMP and EIS ROD for management as bighorn sheep habitat, with a small portion (519 acres) managed as a WSA in accordance with the IMP for Lands with Wilderness Characteristics. The resident bighorn sheep herd in the ACEC is nationally known and an important contributor to the tourism economy of Dubois. Because the ACEC is prominent in the view along Highway 287 (a main route to Yellowstone and Grand Teton National Parks) and the local community, surface disturbance in the ACEC would be highly visible and present a strong contrast with undisturbed areas.

While not designated for visual resource values, the presence of the bighorn sheep makes the area a focus of visitor visual attention. Local tourism is based, in part, on a desire to view the bighorn sheep in the wild, and the barren sweeps of the ACEC make this possible. Management that protects the visual setting of the sheep and protects sheep habitat is important from a tourism standpoint as well as a pure VRM standpoint. However, although Alternative B is more proactive in its management of air quality than alternatives A, C, or D, the air quality in the Whiskey Mountain ACEC would be aggressively managed under all alternatives because the ACEC is near Air Quality Class 1 areas, including wilderness areas and national parks. Therefore, there would be no difference in impacts to visual resources in the ACEC among the alternatives from management of air quality.

In general, management actions from other programs designed to protect physical and biological resources would result in direct beneficial impacts to bighorn sheep by protecting forage and intact habitat. In general, management actions for other programs that would result in adverse impacts to physical and biological resources would adversely impact bighorn sheep and their setting in the ACEC.

Bighorn sheep are extremely sensitive to human presence and disturbances. Management that avoids surface disturbance and human use would beneficially impact bighorn sheep.

The difference in riparian-wetland setbacks among the alternatives (the setback is larger under Alternative B than under the other alternatives) would not result in different impacts to the ACEC because there are no riparian-wetland areas in the ACEC.

Under all alternatives a small part of the ACEC is a WSA managed in accordance with the IMP. Visual resources in the WSA are managed as VRM Class I under all alternatives. This management protects bighorn sheep and visual resource values by limiting surface disturbance and resource uses in the WSA. By special agreement among federal and state agencies, vegetative treatments in the WSA to benefit bighorn sheep are allowed under all alternatives, so management under the IMP would not adversely impact the ACEC.

Land near the Whiskey Mountain ACEC was identified as containing wilderness characteristics due to its remote and scenic qualities. Managing to protect the wilderness values would beneficially impact ACEC values. The alternatives vary in how the identified lands with wilderness characteristics are managed.

Other than the WSA common to all alternatives, there is no other special designation management except the ACEC itself.

Although the alternatives vary in their management actions for air quality, there would not be any differences in air quality impacts among alternatives because for all alternatives, BLM actions must meet the higher standards associated with the wilderness areas to the north and south of the ACEC.

4.7.5.3.5.3. Alternative A

4.7.5.3.5.3.1. Program Management

Alternative A designates the Whiskey Mountain area as an ACEC to protect bighorn sheep habitat. Existing mineral withdrawals would be extended. Alternative A generally manages to balance resource protections with resource use. There is no special management for the nearby lands with wilderness characteristics.

4.7.5.3.5.3.2. Resources

Management that benefits soil and water and other biologic resources would beneficially impact Whiskey Mountain ACEC bighorn sheep and their visual setting. Lands in the Little Red Creek Complex near to but not adjoining the ACEC are identified as lands with wilderness characteristics. These lands are not specially managed, so there would be no beneficial impacts to the ACEC. However, given the special designation because of bighorn sheep, it is not likely that substantial disturbance would be allowed in the Little Red Creek Complex, although Alternative A would not manage it for wilderness characteristics. VRM would beneficially impact visual resources in the ACEC by limiting surface disturbance and visually intrusive actions.

4.7.5.3.5.3.3. Resource Uses

Alternative A would close the Whiskey Mountain ACEC to oil and gas development and proposes to withdraw it from mineral entry. Mineral withdrawals would be extended before they expire if they were withdrawn for a finite period. This management would limit the loss of vegetation, avoid habitat fragmentation, avoid degradation of visual resources, and avoid human intrusion that would result from such development projects. This would result in a highly beneficial impact to ACEC values.

Alternative A closes most of the ACEC to livestock grazing, but authorizes grazing on 2,203 acres having 57 AUMs. The existing BLM permit is available in spring and fall. This grazing would adversely impact bighorn sheep, particularly in the fall, when uses by the permitted horses would reduce forage bighorn sheep need going into winter. In recent years an agreement has been in place to move the fall grazing portion of the permit to WGFD lands to ensure adequate forage is available to bighorn sheep.

Alternative A manages the ACEC as an avoidance areas for major ROWs and corridors, which would protect ACEC habitat values by retaining vegetation, avoiding habitat fragmentation, and preserving the viewshed. Because Alternative A does not manage the area as an ROW exclusion area, if there were no alternative location for a proposed ROW, it would be permitted. No such ROW potential or demand has been forecast under current management, however, the ACEC and the areas around it have high wind-energy potential. In light of resource values and investments made to acquire lands, it is not likely the BLM would grant ROWs and such a permit would only occur after the preparation of an EIS. Alternative A management reauthorizes the communications site on BLM Ridge that expires in 2013. Use of the ROW to access the tower for maintenance would adversely impact bighorn sheep, particularly in fall, winter, and early spring months, when the sheep are present in the ACEC and dependent on ACEC forage for survival.

4.7.5.3.5.3.4. Special Designations

Other than the Whiskey Mountain ACEC, there are no special designations that would impact the ACEC values, with the exception of the small portion that is also a WSA. Travel in the WSA, as in the rest of the ACEC, would be limited to designated roads and trails.

4.7.5.3.5.4. Alternative B

4.7.5.3.5.4.1. Program Management

Alternative B emphasizes wildlife and other resources even if the protective management would adversely impact or limit development. Alternative B extends withdrawals that would expire with time and closes the ACEC to livestock grazing. The Alternative B approach would result in more beneficial impacts to ACEC values than Alternative A.

4.7.5.3.5.4.2. Resources

Management of soil and water resources under Alternative B would beneficially impact Whiskey Mountain ACEC bighorn sheep and their visual setting by limiting erosion, fugitive dust, and by preventing habitat degradation and fragmentation. Alternative B would manage the Little Red Creek Complex as non-WSA land with wilderness characteristics and manage it to protect the naturalness and outstanding opportunities for solitude which would beneficially impact ACEC values because it would preclude uses that would contrast with the ACEC visual setting.

Alternative B manages grassland and shrubland communities to support the bighorn sheep population, which would beneficially impact ACEC values. Vegetative treatments would also benefit bighorn sheep. Any forestry actions under Alternative B would benefit bighorn sheep, including in the WSA. In general, Alternative B wildlife management would be more protective of ACEC wildlife values than Alternative A.

4.7.5.3.5.4.3. Resource Uses

Locatable minerals management under Alternative B would result in the same beneficial impact to ACEC values as Alternative A by renewing the existing withdrawals. Alternative B closes the ACEC to mineral materials disposals, but this would have the same beneficial impact as the informal closure under Alternative A.

Alternative B would close the ACEC to oil and gas leasing, while Alternative A applies NSO stipulations. The difference in impacts between alternatives A and B is minor, because the area has no potential for CBNG and very low potential for conventional oil and gas. Alternative B closes the ACEC to phosphate leasing; the area is open under Alternative A. Alternative B management would result in more beneficial impacts to ACEC wildlife and scenic values because the area has phosphate resources. While it is not likely that phosphate leasing, a BLM discretionary activity, would be allowed under Alternative A, Alternative B closes the ACEC, thereby removing any possibility of leasing. Phosphate mining would have an adverse impact to bighorn sheep due to human presence and the removal of vegetation.

Alternative B management of wind-energy development and major ROWs and corridors would be somewhat more beneficial to ACEC values than Alternative A, because Alternative B manages the ACEC as an exclusion area for these realty actions. Even if no other routes are available including ROWs and corridors, the realty action would be denied under Alternative B. Under Alternative A, it is possible that a ROW would be allowed. However, there is little difference between the impacts of the two alternatives because the demand for a ROW is low. Alternative B does not renew the lease for the communications site on BLM Ridge. The site represents a visual intrusion into the bighorn sheep setting, and regular maintenance increases the human presence during fall, winter, and early spring seasons, when the sheep depend most on the ACEC habitat.

Alternative B livestock grazing management would be more beneficial to bighorn sheep because it closes the allotment in the ACEC to livestock grazing, allowing it to be used by the bighorn sheep in the fall, an important time for the bighorn sheep to feed before winter. The primary difference between alternatives B and A is that while fall grazing is allowed on the allotment under Alternative A, recently, the operator has grazed on WGFD lands in the fall. However, this practice may not continue.

Alternative B recreation management would be more protective of wildlife values because the Dubois Mill Site near the ACEC is not open to motorized recreation and guarantees a primitive recreation experience. Under Alternative B, the Dubois Mill Site is managed as a community SRMA for nonmotorized recreation. Although there is a potential adverse impact by bringing more recreationists closer to bighorn sheep, which are wary of human presence and can experience adverse impacts from recreation activities, the more likely result would be to have the nonmotorized recreation occur at lower elevations by town residents and not have recreational activities advance into the bighorn sheep habitat. Alternative B would be more protective of ACEC values by closing the Dubois Mill Site to cross-country mechanized travel than Alternative A, which manages the area as open to such travel.

The impacts of travel management under Alternative B would be similar to Alternative A.

4.7.5.3.5.4.4. Special Designations

Under Alternative B, the only special designation other than the Whiskey Mountain ACEC is the WSA common to all alternatives. Under Alternative B, the WSA would be closed to motorized and mechanized travel which beneficially impacts bighorn sheep by reducing human presence and travel disruption.

4.7.5.3.5.5. Alternative C

4.7.5.3.5.5.1. Program Management

Alternative C does not designate the Whiskey Mountain area as an ACEC. Standard stipulations are applied to authorized activities. Alternative C emphasizes resource use, and protects wildlife, such as bighorn sheep, at minimal levels. Bighorn sheep are not considered a BLM sensitive species, so there are no standard stipulations for their protection. The area is open to oil and gas leasing with surface occupancy, and mineral withdrawals are allowed to expire.

4.7.5.3.5.5.2. Resources

The Alternative C emphasis on resource uses over physical and biological resources would result in more adverse impacts to bighorn sheep in the Whiskey Mountain ACEC. Alternative C manages soil and water with standard stipulations.

Alternative C grassland and shrubland management would be less beneficial to wildlife because it emphasizes forage production for all grazing animals and not, as under Alternative B, for bighorn sheep. Alternative C vegetative treatment also emphasizes forage, and not ecological diversity or wildlife needs.

Alternative C does not manage lands with wilderness characteristics in the Little Red Creek Complex specifically to preserve their wilderness characteristics. Therefore, there would be no beneficial impact to bighorn sheep. It is possible that this approach to the Little Red Creek Complex could adversely impact bighorn sheep if the Little Red Creek Complex is utilized to access the Shoshone National Forest Wilderness.

Alternative C VRM would result in more adverse impacts to ACEC values than Alternative B because outside of the WSA, Alternative C allows development that would contrast with the existing landscape. This management would result in a substantial potential for surface disturbance and disruptive activity that would adversely impact bighorn sheep and their visual setting if there were a demand for it.

4.7.5.3.5.5.3. Resource Uses

Locatable and leasable minerals management under Alternative C would result in more adverse impacts to ACEC values than Alternative A or Alternative B. Alternative C opens the non-WSA portions of the ACEC to leasing with surface occupancy. No Plan of Operations is required under Alternative C for locatable mineral exploration on less than 5 acres. As a result the BLM would have little ability to limit adverse impacts to soil, vegetation, water quality, and visual resources from mineral exploration. Initially, these adverse impacts would not occur in most of the ACEC, but as mineral withdrawals expire, there could be additional adverse impacts to bighorn sheep. Although potential is low, Limestone Kiln Gulch could have some potential for phosphate and limestone. Alternative C allows geophysical exploration, which would adversely impact wildlife and visual resources due to vegetation and soil compaction.

Alternative C management of major ROWs and corridors, including wind-energy development and transmission lines, could result in substantially more adverse impacts to visual resources than under Alternative B, which excludes these developments. It is not likely that there would be a strong demand for major ROWs in light of the protections afforded by the adjoining Wilderness designation. However, demand for access to the area across BLM-administered land could arise in the future, particularly as the population of Dubois grows. Like Alternative A, Alternative C management would reauthorize the communications site on BLM Ridge that will expire in 2013. Use of the ROW to access the tower for maintenance would adversely impact bighorn sheep, particularly in fall, winter, and early spring months, when the sheep are present in the ACEC and depend on ACEC forage for survival.

Travel management for the nearby Dubois Mill Site is the same under Alternative C as under Alternative A, which would allow motorized travel on existing roads and trails. This would result in far fewer beneficial impacts to ACEC values than Alternative B, which closes the area. There is demand for motorized vehicle access to BLM-administered land from the Dubois Mill site, so it is likely that motorized use would result in substantial adverse impacts to ACEC values.

Alternative C would allow livestock grazing on the allotment during both the spring and fall seasons resulting in adverse impacts to ACEC values very similar to Alternative A, with more adverse impacts than under Alternative B. Additional range infrastructure would not be precluded but the demand for such development is likely low.

Recreation management under Alternative C, like Alternative A, would have adverse impacts to bighorn sheep because motorized use is emphasized, rather than the more beneficial impacts of nonmotorized recreation under Alternative B. Management for the nearby Dubois Mill Site also allows motorized use and cross-country mechanized (bicycle) travel and would, therefore, result in more adverse impacts than Alternative B from this type of use.

4.7.5.3.5.5.4. Special Designations

Alternative C does not designate Whiskey Mountain as an ACEC. The WSA travel management would be the same as Alternative A, with the same minor adverse impacts to bighorn sheep.

4.7.5.3.5.6. Alternative D

4.7.5.3.5.6.1. Program Management

Alternative D designates the same area as Alternative A as an ACEC. In general, Alternative D management protects resources of priority concern, such as bighorn sheep. Alternative D closes the entire Dubois area to oil and gas leasing, and the ACEC would be closed to all mineral leasing and excluded from major ROW development. This management would result in substantial beneficial impacts to ACEC values.

4.7.5.3.5.6.2. Resources

Alternative D management of soil and water resources would benefit bighorn sheep by limiting erosion and fugitive dust. Alternative D would manage 4,954 acres as non-WSA land with wilderness characteristics to protect their wilderness character. This management would beneficially impact bighorn sheep because it restricts motorized vehicle use and prohibits surface-disturbing activities. This management, which is the same as Alternative B except over a slightly smaller area, would be more beneficial to ACEC values than alternatives A and C, particularly with regard to motorized use.

Management of grassland and shrubland communities under Alternative D is the same as under Alternative A, which is to meet NRCS Ecological Site Guide objectives that would beneficially impact bighorn sheep by supporting habitat. All alternatives use an IPM approach to INNS in the ACEC, although Alternative D allows chemical treatments only if other methods are unsuccessful. Alternatives B and D are also more proactive in addressing the link between BLM-permitted activities and the spread of INNS, which would avoid some of the adverse impacts that could result under alternatives A and C.

Alternative D wildlife management for the Dubois area would have more beneficial impacts to bighorn sheep because the entire area would be closed to oil and gas leasing for the protection of special status species. This management would result in less human contact and surface disturbance throughout the area which would benefit the ACEC bighorn sheep that travel in and out of the ACEC. Similarly, although Alternative D general wildlife management is the same as Alternative A (regarding allowing roads in crucial winter range), it is very unlikely that there would be a demand for any kind of ROW, or that the BLM would grant one under alternatives A, B, or D, in contrast with Alternative C.

Alternatives A, B, and D, all limit roads and fences for the benefit of bighorn sheep, although Alternative A would result in slightly more adverse impacts because it retains the existing pasture fence. Alternative C does not limit roads or fences in bighorn sheep habitat, so the adverse impacts associated with this type of habitat fragmentation and surface disturbance would occur under Alternative C.

Alternative D VRM would result in similar beneficial impacts to Alternative B. This would avoid the adverse impacts that would result from more less restrictive VRM, which would allow more visual intrusions into the ACEC and more human presence.

4.7.5.3.5.6.3. Resource Uses

Similar to Alternative B, Alternative D leasable and mineral materials management would result in more beneficial impacts to ACEC values than Alternative A. Alternatives B and D close the ACEC to phosphate leasing, mineral materials disposals, and geophysical exploration. Like Alternative B, Alternative D closes the ACEC to oil and gas development. In the locatable mineral program, Alternative D would result in the same beneficial impacts to ACEC values as alternatives A and B, as these alternatives withdraw the entire ACEC.

Alternative D management of wind-energy development and major ROWs and corridors would result in more beneficial impacts to ACEC values than Alternative A, since Alternative D manages the ACEC as an exclusion area. Unlike Alternative B, Alternative D closes only one pasture of the allotment in the ACEC to livestock grazing and allows higher utilization levels — closing a total of 28 AUMs. This would be more beneficial than Alternative A, which authorizes 57 AUMs, but less beneficial than Alternative B which closes 57 AUMs. It is not likely that any range improvement projects would be authorized under Alternative D.

Recreation management under Alternative D would beneficially impact ACEC values because it focuses on nonmotorized recreation and manages the Dubois Mill Site for pedestrian activities which keeps motorized vehicles away from the bighorn sheep. Under Alternative A, this area is not closed to motorized activities.

4.7.5.3.5.6.4. Special Designations

Other than ACEC designation and the small portion of the area managed as a WSA, there are no special designations in the Whiskey Mountain area. The WSA is closed to motorized travel in Alternative D which is more beneficial than Alternative C.

4.7.5.3.6. Detailed Analysis of Alternatives – East Fork

4.7.5.3.6.1. Summary of Impacts

Alternative A designates 4,431 acres as an ACEC. Alternative B designates 7,744 acres, and Alternative D designates 7,745 acres as an ACEC to protect elk habitat. Alternative C does not designate the area as an ACEC and manages it with standard stipulations. The difference between alternatives B and D is the transfer of 342 acres from the Dubois Badlands ACEC in Alternative B to the East Fork ACEC in Alternative D.

Alternative C would result in the most adverse impacts to ACEC values because it manages the area with standard stipulations which would not preclude surface disturbance that would adversely impact elk and bighorn sheep including mineral activities and ROWs. Alternative A has fewer adverse impacts because the mineral withdrawals are extended, oil and gas leasing has a NSO stipulation, and the ACEC is avoided for major ROWs. Alternatives B and D have similar management with limited adverse impacts to ACEC values. Alternative D would result in fewer adverse impacts because the entire Dubois area is closed to oil and gas leasing, while Alternative B only closes East Fork (and the other two Dubois-area ACECs) (Table 2.4, “Comparative Summary of Areas of Critical Environmental Concern by Alternative” (p. 37)).

Alternatives B and D are very similar in their beneficial impacts. Both alternatives would emphasize resource protections over resource uses and both would limit mineral actions. Both have similar VRM and wildlife protections and would limit livestock grazing to 691 acres within the East Fork ACEC. Additionally, there is no difference in size of ACEC management because while Alternative D has more acres in the East Fork ACEC, those lands are managed by the Dubois Badlands ACEC under Alternative B. Alternative A is the next most beneficial because the ACEC emphasizes protection of elk and bighorn sheep over resource uses such as oil and gas, and pursues a withdrawal on part of the area, though fewer acres than Alternative B. Alternative C would result in the fewest beneficial impacts because VRM management would allow more surface disturbance and oil and gas development is not limited. Although the potential is low, there is some oil and gas development in the area. Alternative C would beneficially impact elk only to the extent that slope and riparian-wetland setbacks preclude surface disturbance.

4.7.5.3.6.2. Impacts Common to All Alternatives

The East Fork area was designated as an ACEC in the 1987 RMP and EIS ROD to protect the crucial winter range for elk and, to a lesser degree, bighorn sheep habitat. To support the winter elk habitat, the WGFD has acquired lands in the East Fork area and undertaken protective management on these lands.

While the alternatives vary in their management of air quality, it is not likely that there would any differences in impacts to ACEC values. The East Fork area is close to the Washakie and Fitzpatrick Wilderness Areas and degradation of air quality under any alternative that could potentially impact elk adversely, would be limited.

Since visual resources are not relevant or important values of concern for this area, this analysis does not consider impacts to visual resources in determining adverse or beneficial impacts to ACEC values. However, to the extent that VRM precludes surface disturbance, it would beneficially impact elk habitat. Human intrusion would result in particularly adverse impacts to elk compared to other big game, so the more other management strategies such as visual resource prescriptions limit development, the more beneficial the impacts to ACEC values.

Fuels and vegetative treatments are the same under all alternatives. There would be some vegetative treatment that would benefit elk forage under all alternatives. These treatments would result in long-term beneficial impacts to wildlife habitat by contributing to vegetative diversity and fostering elk forage. While the alternatives vary in the approach taken to silvicultural techniques, impacts are not likely to vary among the alternatives because it is assumed that due to the availability of timber in the Dubois area outside of the ACEC, forest resources in the East Fork area would not be managed for commercial use, even under Alternative C. Accordingly, forest products and silvicultural techniques are not further analyzed.

Under all alternatives, hunters and anglers would use primitive camping sites in the ACEC for recreational purposes. There is no difference among the alternatives regarding recreation management of these camping areas.

There is a pre-FLPMA locatable mineral withdrawal of 3,470 acres in East Fork area. This withdrawal does not expire and does not vary by alternative, therefore it is not further addressed in this section.

Under all alternatives, the existing ACEC would be closed to livestock grazing. The alternatives vary regarding livestock grazing in the proposed expanded ACEC and non-WSA lands from the Dubois Badlands.

Although the alternatives differ in their management of ROWs, including wind-energy development, there would be little to no difference in the potential impacts. Although some of the ACEC has potential for wind, there is no transmission line support for exporting the produced electricity. The nearby lands managed as Wilderness in the Shoshone National Forest make it unlikely that East Fork would be considered a suitable location for wind-energy development. Accordingly, ROWs are not further analyzed in this section.

To support ACEC values, alternatives B and D expand the ACEC originally designated in 1987 to include lands acquired after the 1987 RMP and EIS ROD. These lands were not added to the East Fork ACEC at the time of acquisition. This section refers to the area identified under Alternative B as the "expanded area," and separately identifies management for the "expanded area" only if it is different from management of the original ACEC. In addition to the expanded area under Alternative B, Alternative D assigns certain lands managed as part of the Dubois Badlands ACEC under Alternative A to become part of the East Fork ACEC. These lands are identified here and for the Dubois Badlands ACEC as the "non-WSA lands in the Dubois Badlands."

4.7.5.3.6.3. Alternative A

4.7.5.3.6.3.1. Program Management

The existing plan designated 4,431 acres in the East Fork area as an ACEC for elk crucial winter habitat. In addition, a small resident herd of bighorn sheep also occupy the ACEC (see the ACEC Report for a detailed discussion of these values). In general, Alternative A balances resource protection with resource use. On a site-specific basis this balance might not protect a resource as fully as would be the case if resource protection were the emphasis. However, Alternative A prescriptions would result in beneficial impacts to wildlife in the area, primarily elk.

Alternative A manages the lands in the expanded area similarly to the ACEC lands and surrounding WGFD lands.

4.7.5.3.6.3.2. Resources

Management actions from other programs that protect physical and biological values would result in direct beneficial impacts to East Fork ACEC elk by protecting forage and maintaining intact habitat. Soil and water management under Alternative A is according to standard stipulations, which would beneficially impact the elk by limiting or relocating some surface disturbance. Vegetation is managed to provide forage for wintering elk, which would benefit ACEC values.

Because visual resources are not considered a value of concern, Alternative A VRM of the East Fork ACEC is identified in the visual resource program. VRM management would result in beneficial impacts to ACEC values by limiting or prohibiting visually intrusive projects, although some surface-disturbing activities may be allowed.

4.7.5.3.6.3.3. Resource Uses

Under Alternative A, the East Fork ACEC would be managed with a NSO restriction for oil and gas development, and other solid mineral leasing and the expanded area would be managed under standard stipulations. The ACEC is also withdrawn from locatable mineral entry, but the expanded area would not be withdrawn. Although the potential for oil and gas in the ACEC is low, oil and gas development is occurring not far from the ACEC on BLM-administered lands and is proposed in the Shoshone National Forest. No potential for locatable minerals has been identified for the expanded area, however, exploration could occur without a Plan of Operations which could result in adverse impacts to elk habitat.

Alternative A closes the East Fork ACEC to mineral materials disposal, but does not close the expanded area. It is unlikely that disposals would be approved because of the adverse impacts to elk. No demand for mineral materials in the expanded area is anticipated. However, surface disturbance as a result of mineral development of any kind would result in short- and long-term adverse impacts to elk.

Alternative A does not authorize livestock grazing in the ACEC or in the expanded area except on 641 acres. However, lands in the expanded area were never officially closed to livestock grazing. Rangeland infrastructure, including fences and water projects, are not precluded on the 641 acres where grazing is authorized, but it is unlikely that a project action that would adversely impact elk would be authorized.

Alternative A limits motorized vehicle travel to existing roads and trails. Alternative A does not include seasonal closures for motorized over-snow travel and does not restrict cross-country mechanized travel. Travel by motorized vehicles during winter would result in adverse impacts to elk. However, because the majority of BLM-administered lands in the ACEC and expanded area are surrounded by WGFD controlled lands, most of the BLM-administered lands are seasonally closed due to the WGFD closures.

4.7.5.3.6.3.4. Special Designations

Under Alternative A, there are no special designations in the East Fork area except the ACEC.

4.7.5.3.6.4. Alternative B

4.7.5.3.6.4.1. Program Management

Alternative B expands ACEC protections to 3,313 more acres than Alternative A, for a total of 7,744 acres. Therefore, BLM-administered lands in the expanded area are designated as part of the ACEC with the same management prescriptions that would complement management of the surrounding WGFD lands.

4.7.5.3.6.4.2. Resources

Alternative B management of soil and water resources would benefit wildlife by limiting erosion and fugitive dust.

Following a fire, Alternative B would result in more beneficial impacts to forest resources than Alternative A because Alternative B mandates forest replanting. Alternative B management to protect forest health from insect and disease outbreak would likely result in more short-term adverse impacts than Alternative A, because treatment under Alternative B would be attempted solely to protect human health and safety. The impact of this management could result in short- and long-term adverse impacts to elk habitat, because it would increase the likelihood of landscape-level fires that would result in detrimental impacts to elk habitat.

Alternative B management of grassland and shrubland communities is similar to Alternative A, and would result in the same beneficial impacts to elk.

Wildlife management under Alternative B is more protective of wildlife values than Alternative A. Where grazing is allowed on the expanded ACEC, utilization is adjusted as needed to meet elk herd objectives, and vegetation management emphasizes wildlife needs. Management, including the management of visual resources, of the existing ACEC lands is the same under Alternative B as Alternative A, so the level of impacts would be the same.

4.7.5.3.6.4.3. Resource Uses

Alternative B management of locatable, leasable, and mineral materials is more protective of ACEC values than Alternative A because Alternative B extends the protections to the expanded area. Alternative B withdraws the expanded area from locatable mineral entry and closes it to leasable minerals and mineral materials disposal. The difference in beneficial impacts between Alternative B and Alternative A would directly depend on the risk of surface disturbance through mineral exploration and development.

Impacts from livestock grazing under Alternative B are the same as under Alternative A, except Alternative B officially closes the majority of lands in the expanded area. Under both alternatives, forage is managed to benefit elk. Alternative B, by not approving rangeland projects in other parts of the planning area, would have more funds available for non-infrastructure range improvements such as vegetative treatments. Infrastructure would be approved in the expanded area if needed to benefit elk. It is not likely that this management would result in a substantial difference in impacts between the two alternatives.

Recreational management under Alternative B is generally the same as Alternative A, so impacts to ACEC values would similar. Travel management under Alternative B would be more beneficial to ACEC values because, not only does Alternative B protect more acres, it limits travel to designated roads and trails and includes seasonal limitations on all motorized vehicles, including over-snow vehicles. Therefore, travel management under Alternative B would result in more beneficial impacts to elk. In addition, Alternative B prohibits cross-country mechanized travel, which would result in more beneficial impacts to elk by protecting habitat from vegetation loss.

4.7.5.3.6.4.4. Special Designations

Alternative B does not include special designations other than the East Fork ACEC itself.

4.7.5.3.6.5. Alternative C

4.7.5.3.6.5.1. Program Management

Alternative C does not designate any acres in the East Fork area as an ACEC. Alternative C management would use standard stipulations to protect the ACEC values and mitigate impacts to wintering elk.

4.7.5.3.6.5.2. Resources

Alternative C emphasizes resource uses over physical and biological resources, which would result in somewhat more adverse impacts to wildlife in the ACEC. Full fire suppression under Alternative C would likely result in more beneficial impacts to elk than Alternative B, which uses suppression only to protect human health and safety.

Alternative C grassland and shrubland management would be slightly less beneficial to elk because it would emphasize forage production for all grazing animals and not, as under Alternative B, for wildlife. Alternative C vegetative treatment also emphasizes forage and not ecological diversity or wildlife needs.

Alternative C wildlife management would result in more adverse impacts to wildlife, specifically elk, than Alternative B. Forage allocations under Alternative C emphasize livestock grazing use rather than wildlife in portions of the expanded area where grazing is allowed. Alternative C does not limit habitat fragmentation or increase vegetation by closing roads or limiting the footprint of projects. Alternative C does not apply seasonal restrictions to oil and gas O&M activities, therefore, O&M activities could disrupt elk during the winter. These impacts are described in more detail in the *Biological Resources* section. Since this alternative would allow the subdivision and development occurring on private lands, this impact could increase in importance over time.

Alternative C manages the ACEC and expanded area as VRM Class III, which would be more likely to adversely impact ACEC values than the VRM Class II in Alternative B. This management would allow more surface disturbance by larger projects, and would result in more adverse impacts to elk than Alternative B to the extent that there is a demand for surface-disturbing activities.

4.7.5.3.6.5.3. Resource Uses

Locatable and leasable minerals management under Alternative C could result in more adverse impacts to ACEC values than Alternative A or B. Alternative C would open all of the ACEC to mineral leasing with surface occupancy. Current withdrawals are allowed to expire, so these areas would then be available for locatable mineral entry, as is the expanded area. Absent locatable mineral withdrawal or ACEC designation, Alternative C does not require a Plan of Operations for exploration that would disturb fewer than 5 acres. This management would result in more adverse impacts to the East Fork ACEC than Alternative B and Alternative A. Adverse impacts to ACEC values would be directly related to the likelihood of mineral development. Both the ACEC and the expanded area have low potential for oil and gas, although any exploration or geophysical activities would result in adverse impacts to elk.

Alternative C also opens the area to solid mineral leasing with surface occupancy. Although low, there is some potential for phosphate. Any solid mineral development would remove all vegetation from the area mined and create a pit to a depth necessary to recover the phosphate. Strip mines are not easy to revegetate and there would be long-term loss of forage, with potentially irreversible adverse impacts to elk. The most likely impacts from solid mineral leasing would be from exploratory activities, which would adversely impact elk by increasing human presence and removing vegetation.

Livestock grazing management under Alternative C would result in adverse impacts to ACEC values similar to Alternative A, and somewhat more adverse than Alternative B. Alternative C authorizes higher forage utilization levels, which would reduce the vegetation available to wildlife in the expanded area, and makes progress toward rangeland health through additional infrastructure, including water developments and fencing. Increased infrastructure would concentrate livestock, adversely impacting vegetation, and fences can fragment habitat and migration corridors. Impeding movement would adversely impact elk that winter in the ACEC and move to habitat in the Shoshone National Forest in summer. However, range developments could result in faster progress toward reaching rangeland health, which would beneficially impact wildlife. The private lands in the area are generally already fenced.

Alternative C recreation management in the ACEC focuses on maintaining the safety of recreationists and reducing conflicts, not on guaranteeing current recreation experiences. This would be less beneficial to ACEC values than Alternative B.

Alternative C would result in more impacts to elk from travel management than under Alternative A and fewer beneficial impacts than Alternative B, because Alternative C does not include limitations on winter travel. Winter is when elk depend most heavily on the ACEC for habitat, so this adverse impact could be severe.

4.7.5.3.6.5.4. Special Designations

Alternative C does not designate any of the East Fork area as an ACEC, and does not include other special designation management that would impact ACEC values.

4.7.5.3.6.6. Alternative D

4.7.5.3.6.6.1. Program Management

Alternative D designates the original 1987 ACEC, the expanded area (from Alternative B), and 392 acres of non-WSA land in the Dubois Badlands as an ACEC for a total of 7,745 acres. Alternative D wildlife management would beneficially impact elk in the ACEC.

4.7.5.3.6.6.2. Resources

Alternative D management of air quality, soil, and water would beneficially impact wildlife and visual resources by limiting erosion and fugitive dust with generally the same beneficial impacts as Alternative B.

Following a fire, Alternative D, like Alternative A, would result in fewer beneficial impacts to forest resources than Alternative B because Alternative D mandates forest replanting only after natural processes do not result in regeneration. Replanting after a landscape-level fire would ultimately beneficially impact elk, but not within the planning period.

Alternative D management of grassland and shrubland communities would be the same as Alternative A which is to meet NRCS Ecological Site Guide objectives, resulting in a natural diversity of wildlife and game. Alternatives A, B, and D, would result in more beneficial impacts to ACEC values than Alternative C, which emphasizes the production of forage that would be shared with livestock on part of the ACEC.

In general, Alternative D wildlife management would result in more beneficial impacts to ACEC values than Alternative A because Alternative D closes the entire Dubois area to oil and gas leasing. This action would avoid the demand for ROWs through or near the ACEC and otherwise limit the kinds of surface disturbance and disruption that would adversely impact elk.

Similar to Alternative A, Alternative D manages forage and adjusts livestock utilization as needed to meet big game herd objectives and vegetation management emphasizes wildlife needs. This would result in beneficial impacts similar, but possibly less beneficial, to ACEC wildlife than Alternative B. However, because so little of East Fork ACEC is grazed under Alternative D, there would be very little difference in impacts between alternatives B and D. Alternative D road closures to benefit wildlife would result in some long-term beneficial impacts to ACEC wildlife and resource values. However, this action would not be likely to result in many beneficial impacts because there are very few redundant roads in the ACEC.

Alternatives B and D protect visual resources more than alternatives A and C, because alternatives B and D manage all of the ACEC as VRM Class II which would reduce surface-disturbing activities and thus benefit the elk.

4.7.5.3.6.6.3. Resource Uses

Alternative D leasable mineral and mineral materials management would result in more beneficial impacts to ACEC values than alternatives A and C, but fewer beneficial impacts than Alternative B. Like Alternative B, Alternative D closes the ACEC to phosphate leasing, mineral materials disposal, and geophysical exploration. Similar to Alternative A, Alternative D manages the ACEC through a NSO stipulation for oil and gas. In the locatable mineral program, Alternative D would result in the same beneficial impacts to ACEC values as Alternative B, because alternatives B and D withdraw the entire ACEC. Alternative A does not withdraw any new areas, although it does maintain existing withdrawals. However, mineral resources in the ACEC are primarily phosphate rather than locatable minerals; therefore, the difference in impacts of this management is limited.

Alternative D livestock grazing management would result in fewer adverse impacts to ACEC values than Alternative A because Alternative D closes 1,494 more acres in the ACEC to livestock grazing, thereby reducing forage competition. Therefore, under Alternative D there would be no range improvement projects in most of the ACEC, and in the remainder of the ACEC, projects would be allowed only if their purpose was to enhance ACEC values. Alternatives B and D would result in more beneficial impacts than Alternative A, which allows range improvement projects even if they would not be for the benefit of wildlife. Range improvement projects do not need to be for the benefit of improving livestock grazing, so vegetation treatments and infrastructure could be developed in the absence of livestock grazing.

Similar to Alternative B, Alternative D travel management would be more beneficial to wildlife than Alternative A. Although Alternative A limits travel to designated roads and trails with seasonal restrictions, this management has not been implemented in a way that can be enforced. Alternatives B and D designation of roads and trails would be followed with implementation-level planning, which would deter user-created routes and unauthorized road expansions that would be likely under Alternative C travel management. Alternative D extends this protective management to a larger area.

Motorized travel would be seasonally closed under Alternative D for a slightly shorter period than under Alternative B. The Alternative D closure period would not adversely impact elk because they generally leave the ACEC by May 15 and this date is consistent with adjoining WGFD lands. Alternatives B and D seasonal closures are more protective of ACEC values than alternatives A and C, which do not close the area seasonally to motorized vehicle use.

4.7.5.3.6.6.4. Special Designations

There are no special designations in the East Fork area other than the ACEC itself.

4.7.5.3.7. Detailed Analysis of Alternatives – Beaver Rim

4.7.5.3.7.1. Summary of Impacts

Alternative A designates 6,421 acres as an ACEC for geologic and scenic values, Native American values, as well as unique vegetation and habitat. Alternative B expands the ACEC to 20,532 acres with additional management prescriptions. Alternative C does not designate the area as an ACEC but manages it with standard stipulations. Alternative D designates the same area as Alternative A, 6,421 acres, but has more management prescriptions.

Alternative C would result in the most adverse impacts to values of concern because it does not limit surface occupancy for oil and gas or limit ROWs which would present a strong contrast with the viewshed. Alternative A would have fewer adverse impacts but because of reduced VRM, could allow development that would adversely impact ACEC values. Alternative D would result in fewer adverse impacts than Alternative A because it manages the same area with more protections. Alternative B is similar to Alternative D but would apply the protective prescriptions to a larger portion of Beaver Rim.

The most beneficial impacts to ACEC values are under Alternative B, which prohibits the most surface disturbance and would provide the greatest protections for raptors and greater sage-grouse. Alternative D would result in similar beneficial impacts to wildlife and limits on surface disturbance. However, those beneficial impacts are applied to a much smaller area and thus less beneficial than Alternative B. Alternative A would limit some ROWs and oil and gas development, but would result in reduced wildlife benefits. Alternative C's minimal management strategies provide beneficial impacts only where slope restrictions would preclude development on the slope of Beaver Rim, and none at all for visual resources.

4.7.5.3.7.2. Impacts Common to All Alternatives

The view of Beaver Rim from Highway 287 and surrounding areas is important as a viewshed for Native American values and for its geologic sequencing that is easy to see, an extremely rare feature. To highlight the interesting and important views from Beaver Rim, the State of Wyoming installed a visitor observation point with an information sign about the visible geology. Beaver Rim's prominence means that surface disturbance would be highly visible and present a strong contrast with undisturbed areas. It has also been identified as an important area for unique plant communities and raptor nesting areas, and is considered an area important to Native Americans.

Under all alternatives, limitations on surface disturbance would beneficially impact ACEC values, including viewshed and habitat. Similarly, surface disturbance would adversely impact ACEC values.

Fuels and vegetation treatment objectives are the same under all alternatives, although the alternatives would vary in the amount of treatment expected each year. Livestock grazing would be allowed under all alternatives. Forest and grassland/shrubland management would not result in impacts under any alternative and are not analyzed here.

Alternative B designates a larger ACEC (20,532 acres as opposed to the 6,421 acres under Alternative A). All alternatives discuss 6,421 acres as "the ACEC" and the 14,111 additional acres proposed under Alternative B as the "expanded area."

The alternatives would vary in the management of locatable mineral entry. The alternatives that designate the area as an ACEC (alternatives A, B, and D) have the effect of requiring a Plan of Operations for exploration of 5 acres or less. Alternative B withdraws the ACEC. However, there is no identified locatable mineral potential so these differences in management actions are not likely to have different environmental impacts. Locatable mineral management in the ACEC is not further analyzed.

4.7.5.3.7.3. Alternative A

4.7.5.3.7.3.1. Program Management

The 1987 RMP and EIS ROD designated 6,421 acres of Beaver Rim as an ACEC for visual and geologic resources as well as for plant and raptor communities. Native American concerns have been identified. Management under Alternative A is generally supportive of ACEC values, although it limits some of its resource protections in areas where oil and gas potential is high.

4.7.5.3.7.3.2. Resources

See the ACEC Report for detailed discussion of resource values. Management actions from other programs that protect physical and biological values would directly benefit ACEC values. Alternative A vegetative management would result in short- and long-term beneficial impacts to wildlife habitat by contributing to vegetative diversity and preventing INNS encroachment which would directly benefit ACEC values. However, vegetative treatments would result in short-term adverse impacts to visual resources, which could be mitigated by careful feathering of the edges. Under Alternative A, fuels treatment would continue at the historic rate. Alternative A would result in more adverse impacts from INNS by not requiring weed-free feed or livestock flushing.

Alternative A wildlife management would benefit Beaver Rim ACEC values by seasonally limiting disturbance near active raptor nests. Wildlife management does not prohibit fences, which would result in a minor adverse impact to the viewshed which could be mitigated by proper fence placement. Wildlife sage-grouse management would beneficially impact ACEC values both in the ACEC and the expanded area because the areas within ¼ mile of greater sage-grouse leks are closed to surface disturbance. This would visually limit some intrusive development in the ACEC viewshed but would not be fully protective of greater sage-grouse.

Alternative A VRM would beneficially impact the visual and geologic resources in the ACEC by limiting disturbances within and adjacent to the ACEC to those areas that retain the existing character of the landscape. Lands farther away from the ACEC are managed to authorize activities that may contrast with the landscape more than within the ACEC. VRM in the expanded area has relatively few limits on surface disturbance under Alternative A, so there could be considerably more adverse impacts to ACEC values, particularly given the flat top of Beaver Rim and its prominence from a distance.

4.7.5.3.7.3.3. Resource Uses

Alternative A oil and gas management in the Beaver Rim ACEC and the expanded area are subject to NSO restrictions in areas with moderate, low, or no potential for oil and gas, which would limit adverse impacts to visual and geologic resources. Alternative A does not close the ACEC or the expanded area to phosphate leasing, and there is phosphate just outside of the ACEC and well within its viewshed and the viewshed of the ACEC. Phosphate mining would involve stripping the vegetation and overburden to access the mineral (strip mining) and would be highly visible from the ACEC as a long-term adverse impact. Alternative A manages the ACEC and the expanded area to allow mineral materials disposals on a case-by-case basis, which would have the potential to adversely impact ACEC values.

The resources of interest in the ACEC would be adversely impacted by surface disturbance in the area to the east because development there is unlimited, and standard oil and gas stipulations would be applied.

Alternative A opens the ACEC and the expanded area to major ROWs and corridors, which would adversely impact ACEC values. While it is possible that some projects could be sited in a way that would minimize or mitigate adverse impacts, it is more likely that a ROW, particularly a high-profile development such as an industrial wind-energy development, would adversely impact ACEC values, particularly Native American values, if the development was near the ACEC. The ACEC and the lands surrounding it, including the expanded area, have high potential for wind-energy development, which would adversely impact the viewshed, raptors, and would degrade the context of geologic resources.

Alternative A livestock grazing management would allow rangeland improvement projects. However, such development would result in only slightly adverse impacts because it would not be readily visible other than at a close distance, and would be small in scale to Beaver Rim's open vistas. Alternative A's development of range infrastructure would result in fewer vegetation treatments for invasive plant species and juniper encroachment, which would increase the risk of hotter fires that could adversely impact visual resources, unique plant communities, and raptors over the short term and long term, and would adversely impact viewsheds.

Alternative A recreation management in the ACEC and the expanded area supports ACEC values, but the recreation setting is not guaranteed, so there would be no beneficial impacts to ACEC values. Motorized travel is limited to existing roads and trails, which would not protect ACEC values, but the adverse impact would be minimal.

4.7.5.3.7.3.4. Special Designations

Under Alternative A, there is no special designation management in the area except the Beaver Rim ACEC. Paleontological resources have been identified on Beaver Rim, with a National Park Service recommendation for managing that area as an NNL. However, this designation was not pursued and protections for the area are only those under the heritage program. It is not expected that NNL listing would be pursued in the future. The ACEC is not expanded which would adversely impact both the important resources in the area to the east and the visual resources and setting of the ACEC values.

4.7.5.3.7.4. Alternative B

4.7.5.3.7.4.1. Program Management

Alternative B emphasizes protections of resources and focuses less on resource uses. This management would result in the most beneficial impacts to ACEC values. Alternative B designates a larger area, 20,532 acres rather than 6,421 acres, (the expanded area) than Alternative A, and beneficial impacts of ACEC management would occur over a larger area. Conflicting resource uses are limited. Alternative B would close all of greater sage-grouse Core Area, protecting the values of interest to a far greater extent than Alternative A.

4.7.5.3.7.4.2. Resources

Alternative B management of air quality, soil, and water closes more acres to surface disturbance and would benefit wildlife and visual resources in the Beaver Rim ACEC by limiting erosion and fugitive dust. This management would be more beneficial to ACEC values than Alternative A, which restricts surface disturbance in a smaller area. Alternative B implements a more proactive approach to reduce emissions and improve air quality, which could slightly improve the view of the ACEC as observed from Highway 287. Alternative B fuels management would result in impacts similar to Alternative A.

Alternative B is more proactive in addressing the link between BLM-permitted activities and the spread of invasive plant species. The presence of invasive plant species also adversely impacts visual resources, not only because of the different appearance of invasive plant species than native vegetation, but also because of the more intense fire regimes associated with heavy invasive plant species infestation and the resulting adverse impacts to visual resources. However, it is likely that this difference would be visible only at Beaver Rim itself, and would be less visible from a distance because of the geology of the area.

Wildlife management under Alternative B would be more protective of ACEC wildlife values than Alternative A. Alternative B does not allow new fences and would allow removal of some existing fences to improve animal movement. While this ACEC is not designated for wildlife values other than raptors, fence removal would also beneficially impact visual resources to a modest degree by eliminating disturbances and visual intrusions. Alternative B management of greater sage-grouse habitat would beneficially impact ACEC values by reducing considerably more acres around leks to surface disturbance as well as imposing disturbance caps. Disturbance caps and limits on the number of energy developments under Alternative B would provide additional beneficial impacts to ACEC values.

Alternative B VRM would be far more beneficial than Alternative A because Alternative B would allow substantially less visual intrusion that would change the characteristic landscape. This management would limit obtrusive developments that would adversely impact ACEC setting. Expanding this protection to a larger area would result in more beneficial impacts to ACEC values than Alternative A, which allows much more surface disturbance in this area.

4.7.5.3.7.4.3. Resource Uses

Alternative B leasable and mineral materials management would result in somewhat more beneficial impacts to ACEC values than Alternative A, both in the ACEC and in the expanded area. Unlike Alternative A, Alternative B closes the ACEC and the surrounding Core Area to all mineral leasing and mineral materials disposals. Alternative B closure of the area to phosphate leasing would avoid the adverse impacts of an open pit mine in the viewshed of the ACEC from key observation points. Minerals management would be most likely to result in more beneficial impacts under Alternative B than under Alternative A, because of the closure of the area to solid mineral leasing in the ACEC and VRM of the surrounding areas.

Alternative B management of wind-energy development, major ROWs and corridors would be substantially more beneficial to ACEC values than Alternative A. Alternative B would manage the ACEC as an exclusion area for these realty actions, whereas Alternative A allows them unless prohibited by VRM. Extending VRM Class II prescriptions to the expanded area includes lands on which Alternative A would allow wind-energy development and ROWs to transmit the electricity. There is substantial wind energy potential in the ACEC and proposed expansion, as well as surrounding areas within key observation points of the Beaver Rim, so these visual resource prescriptions provide an important benefit.

Alternative B livestock grazing management would result in impacts to ACEC values somewhat different from Alternative A. Grazing management would utilize non-infrastructure range improvement projects, particularly vegetation treatment. This would beneficially impact habitat and viewshed to a moderate degree. Alternative B would manage to limit juniper encroachment, which would decrease the risk of hotter fires, that adversely impact visual resources and raptors, and would improve visual resources. Alternative B management would allow beneficial impacts for INNS grazing management by the Authorized Officer requiring flushing, and establishing forage reserves to support vegetation treatments and reclamation.

Alternative B recreation management is similar to Alternative A and would result in similar impacts. Alternative B would limit travel to designated roads and trails, with implementation-level planning to meet management requirements. This would beneficially impact ACEC values, but only in the long term.

4.7.5.3.7.4.4. Special Designations

Alternative B designates the expanded area as an ACEC. In addition, other special designation management under Alternative B would result in substantial additional beneficial impacts to the Beaver Rim ACEC because so much of the viewshed would be protected from surface-disturbing resource uses in the area not designated under Alternative A. The Government Draw/Upper Sweetwater Sage-Grouse ACEC and the Congressionally Designated Trails ACEC limit mineral, ROW, and some range improvement projects that would result in adverse impacts to the view of and from Beaver Rim. The difference in impacts between alternatives A and B is substantial and would likely increase over time as more development was authorized under Alternative A, particularly bentonite development to the west and wind-energy development to the south and east.

4.7.5.3.7.5. Alternative C

4.7.5.3.7.5.1. Program Management

Alternative C does not designate any portion of the Beaver Rim area as an ACEC. Instead, the area would be managed with standard stipulations. Alternative C emphasizes resource use, with fewer protections for resources. Alternative C would result in more adverse impacts to the values of concern than Alternative A, and substantially more than Alternative B.

4.7.5.3.7.5.2. Resources

The Alternative C emphasis on resource uses over the protection of physical and biological resources would result in more adverse impacts to raptors as well as the visual and geologic resources of the ACEC. Alternative C is like Alternative A in its impacts to air, soil, and water resources and would have similar, slightly more adverse impacts in comparison to Alternative B.

Alternative C impacts from fuels and fire management would be the same as Alternative A.

The larger area open to surface disturbance under Alternative C would also result in slightly more adverse impacts to the viewshed than Alternative B because the likelihood of INNS increases with surface disturbance. The additional acres open to major ROWs and realty actions, and the larger area available for surface disturbance under Alternative C, would increase the likelihood of INNS infestation. Unless the spread of INNS resulted in a landscape-level fire, Alternative C INNS management, while less beneficial than Alternative B, would result in limited adverse impacts to Beaver Rim ACEC visual resources because they are generally viewed from a distance.

Alternative C wildlife management would result in more adverse impacts to ACEC values than Alternative B because Alternative C does not close roads or limit the footprint of projects. Alternative C includes the same management of greater sage-grouse habitat as Alternative A, and therefore, would result in fewer beneficial impacts to ACEC values than Alternative B. Alternative C VRM in the ACEC and expanded area would result in more adverse impacts to ACEC values than the Alternative B VRM Class II management. Under Alternative C, moderate or major changes to the landscape are allowed, which would authorize more disturbance including visually intrusive development.

4.7.5.3.7.5.3. Resource Uses

Alternative C leasable minerals management allows activities that would result in more adverse impacts to ACEC values than Alternative A or B. Alternative C opens all of the ACEC and the expanded area to mineral leasing with surface occupancy. While the ACEC and the expanded area have low to very low potential for oil and gas, there is potential for phosphate resources within the viewshed of the ACEC. Phosphate mining could result in highly adverse impacts to the viewshed from the ACEC by stripping of vegetation and overburden to reach the mineral resource (strip mining). This adverse impact to the viewshed would be irreversible and would likely result in the loss of the raptors because of year-round disturbance.

The Beaver Rim ACEC and the adjoining portions of the Beaver Rim to the east would be leased for oil and gas subject to standard stipulations. This would result in more adverse impacts to the values of concern than under Alternative A and far more than Alternative B.

Management of major ROWs and corridors, including wind-energy development and transmission lines, under Alternative C, would result in substantially more adverse impacts to visual resources than Alternative B, which excludes these developments. The ACEC and the expanded area have high potential for wind energy, and Alternative C opens the area to wind-energy development. This industrialization of the area would result in severe adverse impacts to ACEC visual resources in the short and long term. The demand for ROWs, such as roads and transmission lines to support industrial wind-energy development in the ACEC and the expanded area would likely be high. Moreover, Alternative C management of special designations would increase the likelihood that wind energy and related ROWs would be developed.

Livestock grazing management under Alternative C would result in impacts to ACEC values similar to Alternative A and only slightly less beneficial than Alternative B, although the emphasis on range infrastructure would make vegetation treatment far less likely with adverse impacts to visual resources.

Alternative C does not guarantee recreational setting or experience and would not result in beneficial impacts to ACEC values. Recreation *per se* would not be expected to result in adverse impacts to ACEC values. Similar to Alternative A, impacts to ACEC values from travel management under Alternative C would be slightly more adverse than Alternative B. This impact would only be apparent over the long term.

4.7.5.3.7.5.4. Special Designations

Alternative C does not have any special designations neither in the original ACEC or in the expanded area so special designation management (other than the ACEC itself) would not impact values of concern.

4.7.5.3.7.6. Alternative D

4.7.5.3.7.6.1. Program Management

Alternative D manages some areas with more resource protections and some areas for resource uses such as mineral development. In areas with low potential for mineral resources and areas of high resource values, Alternative D emphasizes resource protection. Alternative D designates the same number of acres as an ACEC as Alternative A, but fewer than Alternative B. Alternative D manages 6,421 acres as the Core Area with limits on surface disturbance and the number of energy developments. Alternative D applies an MLP to the area to the east of the ACEC, which would provide additional resource protections in this area.

4.7.5.3.7.6.2. Resources

Alternative D implements the same approach to emissions and air quality, and soil and water resources as alternatives A and C and would have the same limited beneficial impacts to ACEC values of concern by limiting surface disturbance. Alternative D management of INNS is the same as Alternative A, and would be less likely to result in short-term adverse impacts than Alternative B, which provides that treatment be attempted only to protect human health and safety, although the difference is limited.

Alternative D wildlife management would result in more beneficial impacts to ACEC wildlife values than Alternative A, substantially more than Alternative C, and the same as Alternative B because of the more extensive greater sage-grouse buffers that are applied to surface disturbance in both the ACEC and the expanded area (which are both in the Core Area). In addition, Alternative D manages the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area under an NSO restriction for oil and gas, which would beneficially impact the Beaver Rim ACEC. Raptor seasonal limitations are applied to a larger buffer than in Alternative C and the same as Alternative A, which beneficially impacts raptors, a value of concern.

Alternative D management of paleontological resources is the same as alternatives A and C regarding the Beaver Rim proposed NNL, and would result in the same slightly adverse impacts in comparison to Alternative B. Alternatives B and D are more protective of visual resources in the ACEC than alternatives A and C because alternatives B and D manage all of the ACEC and almost all of the expanded area as VRM Class II, which would limit visually intrusive activities that would adversely impact ACEC values.

4.7.5.3.7.6.3. Resource Uses

Alternative D leasable and mineral materials management would result in more beneficial impacts to Beaver Rim ACEC values than Alternative A, but fewer beneficial impacts than Alternative B. Like Alternative B, Alternative D closes the ACEC to phosphate leasing, mineral materials disposals, and geophysical exploration. Like Alternative A, Alternative D manages the ACEC and most of the expanded area (as a result of the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area) under an NSO restriction for oil and gas development, but does not close it as under Alternative B. Because the area has a low potential for oil and gas, there would be little difference in beneficial impacts between alternatives B and D. The application of the MLP to the area to the east of the ACEC would beneficially impact the ACEC values by protecting their setting from disturbance. This would directly benefit the viewing of the geologic and Native American resources in comparison to Alternative A.

Wind-energy developments and major ROWs and corridors can result in adverse impacts to ACEC values because of the very prominent position of Beaver Rim. Alternative D, like Alternative B, would result in substantially more beneficial impacts to ACEC values than Alternative A because Alternative D manages the ACEC as an exclusion area for ROWs. Alternative A manages the ACEC as an avoidance area to protect ACEC values, so on a case-by-case basis, Alternative A could result in very severe adverse impacts if the ROW were granted. While the face of Beaver Rim is protected from adverse impacts under Alternative C because of slope limitations, the top of Beaver Rim is flat and Alternative C would allow any kind of ROW, despite the resulting adverse impacts to Beaver Rim visual resources. As for the other ACECs, clear and unambiguous closure of the ACEC to ROWs would benefit the public, although this would not be an environmental benefit. Alternative D livestock grazing management would result in fewer adverse impacts to ACEC values than Alternative A because Alternative D allows range improvement projects only to enhance ACEC values, and when the projects are part of a Comprehensive Grazing Strategy. Alternative A includes no such requirement. However, there would likely be only limited beneficial impacts to ACEC values from this management under Alternative D, because range improvement projects would result in limited adverse impacts to visual resources at the distance from which Beaver Rim is viewed.

Alternative D utilizes range infrastructure to meet rangeland health standards but only if pursuant to a Comprehensive Grazing Strategy. This should be beneficial to vegetation and riparian-wetland values that support raptors, although the reduced vegetation treatment would adversely impact visual resources.

Similar to Alternative B, Alternative D travel management would result in slightly more beneficial impacts to ACEC wildlife and scenic values than alternatives A and C, which do include travel limitations. Travel restrictions help to limit the number of user-created trails and resulting adverse impacts to ACEC values. Alternatives B and D designation of roads and trails would be followed with implementation-level planning, which would deter user-created routes and unauthorized road expansions that have been allowed to proliferate under current management (Alternative A) or would continue under Alternative C.

Alternatives B and D limit over-snow motorized travel to snow depth of at least 12 inches; however, alternatives A and C do not include such a limitation. Alternatives B and D would result in more beneficial impacts to vegetation in the area, which would beneficially impact ACEC values to a moderate degree.

4.7.5.3.7.6.4. Special Designations

Alternative D management of the Congressionally Designated Trails would limit surface disturbance which beneficially impacts the viewshed of the Beaver Rim, particularly as viewed from the east.

4.7.5.3.8. Detailed Analysis of Alternatives – Green Mountain

4.7.5.3.8.1. Summary of Impacts

Alternative A designates 14,612 acres of crucial winter range on Green and Crooks Mountain as an ACEC to protect a resident elk herd. In addition, the greater sage-grouse Core Area has been designated within the ACEC boundary. Although greater sage-grouse is not the primary reason for ACEC designation, protection of greater sage-grouse habitat also protects overlapping elk habitat. Alternative B designates 24,860 acres which includes all of the area designated in Alternative A and additional elk parturition habitat. Alternative C does not designate the area as an ACEC and manages it with standard stipulations. Alternative D expands the original ACEC to 21,389 acres but limits the expansion to the parturition areas that are most threatened by mineral development.

Alternative C has the most adverse impacts to values of concern because it would allow the most surface-disturbing and disruptive activities, including wind-energy development, ROWs, and oil and gas development that would adversely impact elk and elk habitat. Alternative A would result in the next most adverse impacts because although the area is managed as an ACEC, and oil and gas is subject to a NSO stipulation, it does not include parturition habitat and does not cap total disturbance in the greater sage-grouse Core Area, which contains elk habitat. Alternative D would have similar but somewhat fewer adverse impacts compared to Alternative A because more restrictions are placed upon resource uses under Alternative D. Alternative B would result in the fewest adverse impacts because it includes all identified parturition habitat and closes the greater sage-grouse Core Area to oil and gas leasing, which would beneficially impact elk habitat, and proposes to withdraw the ACEC from locatable mineral entry subject to valid existing rights.

Alternative B would have the most beneficial impacts because it designates the largest area as an ACEC, closes the most buffer around sage-grouse leks and has surface disturbance caps in greater sage-grouse Core Area, and proposes to withdraw the entire area from locatable mineral entry. Alternative D would have the next most beneficial management as it expands the ACEC, although less than Alternative B, and has the same buffer around greater sage-grouse leks in the Core Area and the same surface disturbance caps. It does not withdraw the area from locatable mineral entry. Alternative A would result in the next most beneficial impacts to values of concern because it designates the area as an ACEC and has a NSO stipulation for oil and gas development. Alternative C would result in the fewest beneficial impacts because it does not designate the area as an ACEC and manages it with standard stipulations. Alternative C has the same buffers around sage-grouse leks as Alternative A.

4.7.5.3.8.2. Impacts Common to All Alternatives

The 1987 RMP and EIS ROD designated the Green Mountain ACEC as an important habitat to a resident, non-migratory elk herd. Impacts from uranium and oil and gas activities in the 1970s and 1980s adversely impacted elk habitat and threatened the remaining habitat. Protections from ACEC designation were determined necessary due to activities from uranium exploration on fewer than 5 acres, which is uncontrolled without an ACEC designation, and surface management for oil and gas development. Since the Green Mountain ACEC designation, elk populations first stabilized and then exceeded identified herd objectives. Most importantly, following the designation, uranium mining activities stopped with the worldwide drop in uranium prices and the termination of federal subsidies on uranium. In addition, the commodity price of oil and gas dropped, which further reduced development activities. As stated in Chapter 3, after the bottoming out of prices in the 1990s and the oil spike of 2007, the price trend for oil and gas and for uranium is now upward with fluctuations regularly occurring. The upward trend of uranium and oil and gas prices are increasing the interest in mineral exploration and development in the Green Mountain area.

Visual resources are not part of Green Mountain ACEC relevant and important features, and management under all alternatives is consistent with general VRM for the area.

In 1987, the Sparhawk cabin was considered relevant and important. At present, it is not considered to be relevant and important as required by 43 CFR 1610.7-2, but under all alternatives it is a contributing feature of the ACEC.

Approximately 9,934 acres of the 1987 ACEC are in the Wyoming Governor's greater sage-grouse Core Area. The alternatives vary in the management of surface disturbance that would affect the Core Area.

All alternatives use an IPM approach that would result in the same impacts under all alternatives, although Alternative B includes more limits on the use of chemical treatment; however, this difference would likely not result in impacts to ACEC values. The alternatives would vary in the amount of funds available for vegetative treatment. Under all alternatives, the ACEC would be open to livestock grazing.

The Green Mountain ACEC contains extensive forest resources (28 percent of the area is forested) and the alternatives would vary in their silvicultural management. However, it is unlikely that the environmental impacts would vary by alternative because of the low demand for timber from this area.

Although there are developed recreation sites on Green Mountain, management of these sites would not vary by alternative or impact elk in the existing ACEC or the ACEC expansion area.

Alternative B designates an additional 10,248 acres adjacent to the existing ACEC, that elk use for parturition habitat, for a total of 24,860 ACEC acres. This analysis refers to this area as the "expanded area" and analyzes it separately from the ACEC designated in 1987 if the impacts would be different.

4.7.5.3.8.3. Alternative A

4.7.5.3.8.3.1. Program Management

Alternative A management limits surface occupancy for oil and gas development to protect important elk values, primarily crucial winter range. Alternative A does not withdraw any portion of the Green Mountain ACEC from mineral leasing, but is otherwise protective of resource values. However, this management would result in adverse impacts to other programs. Alternative A designates 14,612 acres as an ACEC.

4.7.5.3.8.3.2. Resources

The Green Mountain ACEC is for the benefit of the elk herd with special emphasis on protecting the long-term functionality of crucial winter range; management actions from other programs that protect physical and biological resources would directly benefit elk by protecting forage and maintaining intact habitat. Alternative A manages vegetation to provide forage for the elk population, a beneficial impact to elk in the existing ACEC. Alternative A manages air, soil, and water resources with standard stipulations which would beneficially impact elk in the ACEC by limiting surface disturbance.

Under Alternative A, there would be some vegetative treatment in the existing ACEC and the expanded area to improve elk habitat. These treatments would result in long-term beneficial impacts to habitat by contributing to vegetative diversity and health. There would be a short-term adverse impact to elk during the time of treatment; however, treatments would be subject to seasonal protection stipulations in crucial winter range and parturition habitat. Due to seasonal stipulations to protect winter and parturition habitat, conflicts with fall hunting seasons, and a short summer season, vegetative treatment and forest management actions would be limited. Impacts would be the same in the existing ACEC and the expanded area.

Alternative A wildlife management in the ACEC includes seasonal closures for the benefit of wintering elk, which would also protect the expanded area. Alternative A allows the construction of fences, which would limit big game movement, create movement hazards, and cause habitat fragmentation, resulting in adverse impacts to elk in the ACEC. Alternative A applies minimal protections to greater sage-grouse habitat in the 9,934 acres of Core Area in the ACEC, but those minimal protections would result in a beneficial impact to ACEC values because surface disturbance is not allowed within the buffer around leks.

Alternative A cultural and paleontological resources management protects the Sparhawk cabin. In addition, protections adopted as a result of heritage resources in the existing ACEC and expanded area would limit surface disturbance that would adversely impact ACEC forage and habitat.

Alternative A VRM management would adversely impact elk in the existing ACEC and expanded area by allowing more surface-disturbing activities. Adverse impacts would result from activities that increase human presence causing elk to avoid the area and from activities that cause habitat fragmentation.

4.7.5.3.8.3.3. Resource Uses

Oil and gas development in the existing Green Mountain ACEC is subject to NSO restrictions under Alternative A, which limits surface-disturbing activities that cause loss of vegetation and avoids habitat fragmentation, would beneficially impact elk. Alternative A opens the expanded area to oil and gas leasing with standard stipulations which would result in adverse impacts to the parturition habitat. Alternative A does not withdraw the ACEC or the expanded area from locatable mineral entry, and development of the area's uranium resources would adversely impact elk habitat. Alternative A requires a Plan of Operation for exploration of 5 acres or less in the ACEC, which would help limit adverse impacts from small exploratory activities in the ACEC. Alternative A does not require Plans of Operations in the expanded area. Alternative A does not close the ACEC or the expanded area to other mineral leasing, such as phosphate; however, the area has limited solid leasable mineral potential. Alternative A generally manages the ACEC as closed to mineral material disposals, which, if allowed, would adversely impact elk. Because Alternative A does not close the expanded area to such disposals, there could still be adverse impacts to ACEC values in that area from mineral material disposals conducted to support uranium and oil and gas development and road building.

Alternative A manages the ACEC as an avoidance area for major ROWs and corridors, but not the parturition area in the expanded area. An increase in demand for ROWs to access oil and gas development sites and other mining activities could result in adverse impacts to elk and avoidance management might not be adequate to prevent potentially serious cumulative adverse impacts. Alternative A does not limit ROWs in the expanded area, and this would likely adversely impact elk.

Alternative A livestock grazing management allows construction of rangeland infrastructure, including fences and water projects, in the ACEC and the expanded area. Fences adversely impact elk because they inhibit elk movement, cause habitat fragmentation, and can increase vegetation utilization. Moderate utilization of forage by livestock would leave less forage available for wildlife use, adversely impacting elk and other resident wildlife. Additional water development could increase livestock use in areas traditionally used by elk and draw elk into other areas increasing the potential for conflict with livestock and private lands.

The seasonal limitation on motorized travel in the ACEC, which also limits travel in the expanded area, would beneficially impact wintering and calving elk. Otherwise, Alternative A limits motorized travel to designated roads and trails during the open period in the ACEC and to existing roads and trails in the expanded area. Alternative A does not limit mechanized cross-country travel but there is likely little adverse impacts that result from this management. Alternative A would allow over-snow cross-country motorized travel, which could adversely impact elk through harassment or human presence during the winter and calving seasons when elk are most vulnerable.

4.7.5.3.8.3.4. Special Designations

Other than the existing Green Mountain ACEC, Alternative A does not include special designation management.

4.7.5.3.8.4. Alternative B

4.7.5.3.8.4.1. Program Management

Alternative B expands the area designated as an ACEC and proposes to withdraw the ACEC from locatable mineral entry. It is closed to oil and gas leasing and has a 0.6-mile buffer around greater sage-grouse leks in the Core Area.

4.7.5.3.8.4.2. Resources

Alternative B designates a larger ACEC than Alternative A (10,248 more acres, approximately a 70 percent increase). To the extent that Alternative B management would adversely or beneficially impact ACEC values, those potential impacts would be greater than under Alternative A because it applies management actions over a larger area than Alternative A. Alternative B management of air quality, soil, and water would benefit wildlife and visual resources by limiting erosion and fugitive dust. Alternative B water management on the south side of Green Mountain limits surface disturbance which beneficially impacts elk (the south side is an important water recharge area although the limits on the use of pesticide to control INNS may result in more adverse impacts to the elk than under Alternative A which does not restrict their use). Alternative B implements a more proactive approach to reduce emissions and improve air quality; however, except for limiting fugitive dust emissions which can adversely impact vegetation, this would result in little impact to elk in the expanded ACEC. Following a fire or a timber sale, Alternative B would result in more beneficial impacts to forest resources than Alternative A, because Alternative B mandates forest replanting. However, because of the low potential of a large timber sale, beneficial impacts would be modest. The extent of beneficial impacts cannot be assessed because large forest sales would not be likely under any alternative. Alternative B manages grassland and shrubland communities to support a diversity of wildlife and game, which would be more beneficial to wildlife than Alternative A.

Additional vegetation treatment under Alternative B (above the historic average of 160 acres per year) are likely. Depending on the area and type of treatment conducted, additional treatment acres would have short-term adverse impacts to elk and long-term beneficial impacts to elk habitat.

Wildlife management under Alternative B would be more protective of wildlife values than Alternative A. Alternative B would adjust livestock utilization as needed to meet big game herd objectives and manage vegetation to emphasize wildlife needs. Alternative B removes some existing fences and does not allow new fences to avoid habitat fragmentation and limits on movement, which would be a beneficial impact to ACEC elk and substantially more beneficial to elk in the expanded ACEC than Alternative A. Alternative B management to protect greater sage-grouse habitat would limit surface disturbance in a much larger buffer around leks in the Core Area than Alternative A. This management would limit adverse impacts from surface-disturbing and disruptive actions on more acres than under Alternative A.

Visual resources are more protected than under Alternative A because Alternative B would manage all of the expanded ACEC to limit the development of visually intrusive projects. Compared to Alternative A, this management would result in the secondary beneficial impact to elk of limiting habitat fragmentation and human presence.

4.7.5.3.8.4.3. Resource Uses

Locatable, leasable, and mineral materials management under Alternative B would be more protective of ACEC values than Alternative A. Alternative B locatable mineral management would result in more beneficial impacts because it proposes to withdraw the expanded ACEC rather than requiring Plans of Operation. There is substantial potential for oil and gas and uranium resources in the expanded ACEC. Exploration and development of these resources would result in adverse impacts to elk in the existing ACEC and greater adverse impacts in the expanded area. Alternative B closes the ACEC and expanded area to all non-oil and gas mineral leasing, but this would result in little beneficial impact to elk because the potential for these leasable minerals is not high in the expanded ACEC.

Alternative B management of wind-energy development and major ROWs and corridors, would result in substantially more beneficial impacts to ACEC values than Alternative A because Alternative B manages the ACEC as an exclusion area for these realty actions. Even if no other route was available, the realty action would be denied and surface disturbance prevented. The ACEC has high potential for wind-energy resources, and excluding wind-energy ROWs would protect elk from the highly disruptive activities of industrial wind-energy development.

Alternative B livestock grazing management would result in fewer adverse impacts to ACEC values than Alternative A. Alternative B manages grazing for rangeland health by reducing livestock utilization to light levels rather than developing rangeland infrastructure. This management would result in fewer adverse impacts to wildlife than Alternative A, which allows for higher utilization rates, and would decrease livestock concentrations near new water developments and fences. Lower livestock utilization in the expanded ACEC would benefit elk from a forage standpoint, but could slow progress on riparian-wetland health if exclosure fences were not allowed. The funds Alternative A would spend on range projects could be utilized for vegetation treatments under Alternative B to improve rangeland health, resulting in short- and long-term beneficial impacts. However, while fencing on BLM-administered lands would not increase, it is likely that fencing on private lands would increase to meet light utilization levels. It is not possible to estimate the extent to which such fencing would increase as many private lands already have extensive fencing, but fencing generally results in adverse impacts to wildlife.

Alternative B travel management would be more beneficial to ACEC values than Alternative A because Alternative B limits travel in the expanded ACEC to designated roads and trails with seasonal limitations, which is the same as Alternative A. Alternative B also limits mechanized travel to designated roads and trails seasonally, which would limit adverse impacts to elk from encounters with humans in new areas. It is not possible to estimate the extent of this benefit because of terrain and weather limitations to cross-country usage.

4.7.5.3.8.4.4. Special Designations

Other than designation as an ACEC, Alternative B does not include special designation management that would impact ACEC values.

4.7.5.3.8.5. Alternative C

4.7.5.3.8.5.1. Program Management

Alternative C emphasizes resource uses over resource protection, which would adversely impact ACEC values because Alternative C manages the Green Mountain area (and adjoining areas) with standard stipulations.

4.7.5.3.8.5.2. Resources

The Alternative C emphasis on resource uses over physical and biological resources would result in more adverse impacts to resident elk. Unlike Alternative B, Alternative C does not proactively manage air quality, but this would result in minimal impact because visual resources are not a specific value for the ACEC. Alternative C has the same standard stipulations for soil and water resources as Alternative A. Alternative C grassland and shrubland management would be less beneficial to ACEC wildlife than Alternative B because it emphasizes forage production for all grazing animals.

Alternative C non-ACEC wildlife management would result in more adverse impacts to wildlife, and therefore impacts to elk, than Alternative B. Forage allocations under Alternative C emphasize livestock grazing use rather than wildlife. Alternative C does not limit habitat fragmentation or increase vegetation by closing roads or limiting the footprint of projects, which would adversely impact elk. Alternative C would manage greater sage-grouse habitat similar to

Alternative A, which limits surface disturbance in a smaller buffer area than Alternative B. See the *Fish and Wildlife Resources – Wildlife* section which describes these impacts in more detail.

VRM under Alternative C would be more likely to adversely impact ACEC values than Alternative B, because Alternative C would allow for substantially more surface-disturbing activities over a greater area than Alternative B, with resulting adverse impacts to elk.

4.7.5.3.8.5.3. Resource Uses

Alternative C locatable and leasable minerals management would result in more adverse impacts to ACEC values than Alternative A or Alternative B. Alternative C opens the ACEC and the expanded area to mineral leasing with surface occupancy. Alternative C does not require Plans of Operation for locatable mineral exploration on 5 acres or less, which means the BLM would have little ability to limit adverse impacts to soil, vegetation, water, and visual resources from smaller locatable mineral exploration. In light of the identified locatable mineral potential in the area, Alternative C could result in greater adverse impacts to ACEC values than Alternative B. Alternative C opens the ACEC to mineral leasing with surface occupancy which could adversely impact vegetation through increased surface use and disturbance. Alternative C allows geophysical exploration, which would result in short-term adverse impacts to wildlife and visual resources due to vegetation and soil compaction if the process was repeated multiple times, as sometimes happens.

Although Alternative C would make the ACEC available for solid mineral leasing, there is no identified solid-mineral potential in the ACEC or expanded area. Therefore, impacts under Alternative C would likely be similar to impacts under alternatives A and B.

Alternative C management of major ROWs and corridors, including wind-energy development and transmission lines, and minor ROWs would result in more adverse impacts to elk than Alternative B, which would manage the area as an exclusion area for these developments. The Green Mountain ACEC has high potential for wind-energy development and the related need for transmission lines. Impacts from industrial wind-energy development would be generated by surface distance, human presence, and elk displacement. Elk are wary of human presence, and a 450-foot tall tower with moving blades would likely result in more adverse impacts to elk than a road or fence.

Alternative C allows major ROWs in the ACEC. Because of existing and anticipated mineral activities, there would likely be a demand in the ACEC for ROWs. If wind energy is developed in or near the ACEC, then ROWs for transmission lines might increase in the ACEC. It is not possible to quantify this demand, but if development occurs, it would result in a substantial increase in short- and long-term adverse impacts to ACEC values compared to alternatives A and B.

Alternative C livestock grazing management would result in impacts to ACEC values similar to Alternative A. Alternative C authorizes higher livestock forage utilization levels, thereby reducing vegetation available to wildlife, and would utilize additional infrastructure (i.e., water developments, fencing) to improve rangeland health where needed. See the analysis under Alternative B.

Travel management under Alternative C does not apply seasonal restrictions; therefore, it would result in more adverse impacts than Alternative A or Alternative B.

4.7.5.3.8.5.4. Special Designations

Alternative C does not designate Green Mountain as an ACEC and there are no other special designations.

4.7.5.3.8.6. Alternative D

4.7.5.3.8.6.1. Program Management

Alternative D would expand the area designated as an ACEC by 46 percent over Alternative A, but the ACEC is smaller than under Alternative B. The area of expansion under Alternative D would incorporate most of the important parturition area on the south side of Green Mountain, but would not expand to include all of the identified parturition habitat as under Alternative B. As under Alternative B, to the extent that Alternative D management would adversely or beneficially impact ACEC values, those impacts would be greater under Alternative D because it applies management actions over a larger area than Alternative A. In conjunction with other management actions, Alternative D's overall management emphasizes resource protections when specific priority resources are identified.

4.7.5.3.8.6.2. Resources

Similar to Alternative B, Alternative D's management of soil and water resources would beneficially impact wildlife by limiting erosion and fugitive dust. Alternative D's more restrictive management of activities that could degrade water quality would result in the same beneficial impacts to the elk as Alternative B.

Alternative D manages grassland and shrubland communities to support a diversity of wildlife, which would be somewhat more beneficial to wildlife than Alternative A. Like Alternative B, Alternative D limits the use of chemicals for INNS treatment, however, Alternative D would allow chemical treatment if other methods were not successful. Similar to Alternative B, Alternative D could result in more beneficial impacts to vegetation by allowing the Authorized Officer to require livestock flushing before they are turned out on the public lands, if it appears they have ingested INNS feed. Alternatives B and D are also more proactive in addressing the link between BLM-permitted activities and the spread of invasive plant species, which would avoid some of the adverse impacts that could result under alternatives A and C.

Unlike Alternative B, which does not allow most range improvement projects, Alternative D would allow them when pursuant to a Comprehensive Grazing Strategy and to where they benefit ACEC values. Therefore, there would be less funding available for fire and fuels treatment, including for INNS treatment, under Alternative D. In this regard, Alternative D would result in adverse impacts similar to alternatives A and C, which focuses funding on infrastructure and not on vegetative treatments.

Alternative D wildlife management would result in more beneficial impacts to ACEC wildlife values than Alternative A, substantially more than Alternative C, and fewer than Alternative B. Alternative D forage management would be similar to Alternative A, which would be less beneficial to wildlife than Alternative B. As under Alternative A, Alternative D would allow for new road development in crucial winter range. Alternative B would close the ACEC to new road development for wildlife protection and would be more proactive in closing redundant roads to reduce adverse impacts to habitat.

Alternative D would include the same raptor buffers as Alternative A, resulting in fewer beneficial impacts than Alternative B, which doubles the buffer. The ACEC has many raptor nests, so the seasonal limitation on surface disturbance is important. Alternative C would result in the most adverse impacts because it limits surface disturbance around raptor nests on half of the total acres in alternatives A and D.

Like Alternative A, Alternative D would manage forage and adjust livestock utilization as needed to meet big game herd objectives, and manage vegetation emphasizing wildlife needs. This would result in impacts similar to but possibly less beneficial to ACEC wildlife than Alternative B. Alternative D special status species management would be similar to Alternative B, as greater sage-grouse management would beneficially impact the portions of the ACEC that are in the Core Area.

Alternative D cultural resource protections that limit surface disturbance would result in the same beneficial impacts as Alternative A, which would be slightly less beneficial than Alternative B, and less adverse than Alternative C. Alternative D VRM would limit more surface-disturbing activities than Alternative A or Alternative C, but less than Alternative B with corresponding impacts to elk.

4.7.5.3.8.6.3. Resource Uses

Similar to Alternative A, Alternative D applies NSO restrictions to oil and gas development in the Green Mountain ACEC, which would result in beneficial impacts to elk by preventing surface disturbance and animal disturbance and/or displacement. The area elk are protected in a larger area (both in the expanded ACEC and in the parturition area to the south that is included in the ACEC under Alternative B). This impact would be somewhat less beneficial than the impact under Alternative B, which closes the expanded ACEC to oil and gas development. There is moderate oil and gas potential in the existing ACEC and in the expanded area, oil and gas development could result in substantial adverse impacts to elk. Like alternatives A and C, Alternative D opens the entire area to solid mineral leasing; however, given the low potential for phosphate, this is likely to have little adverse impacts to the elk. The area would be open to mineral material disposal, but due to the value of the area to elk, it is likely mineral materials disposals would not be authorized in the ACEC.

The greatest difference among the alternatives is in the management of locatable minerals. Green Mountain and the surrounding area have high potential for uranium, and historic uranium mining likely contributed to the decline in elk numbers in the 1970s and 1980s. Only Alternative B proposes to withdraw the ACEC and the expanded area; therefore, Alternative B would be the only alternative under which locatable mineral management would beneficially impact elk. Alternatives A and D require Plans of Operation (Alternative D would require Plans of Operations for a larger area than Alternative A) for small uranium exploration projects, which would result in some potential to limit adverse impacts to elk. However, this management would result in only modest beneficial impacts to elk, because it does not preclude uranium mines. Whether mines would be developed is uncertain as it would depend on many factors including, but not limited to, uranium prices.

While the withdrawal under Alternative B does not affect existing claims, not all of the ACEC or the expanded area are currently under claims. While alternatives A and D would result in a modest beneficial impact to elk, Alternative C would result in adverse impacts. Alternative B would be substantially more beneficial to ACEC values. Similar to Alternative A, the area would be excluded for major ROWs and avoided for minor ROWs. Alternative D would have greater beneficial impacts than alternatives A and C.

Alternative D livestock grazing management would result in fewer adverse impacts to ACEC values than Alternative A, because Alternative D would allow range improvement projects only to enhance ACEC values and pursuant to a Comprehensive Grazing Strategy, whereas Alternative A has no such requirement. This would likely result in more beneficial impacts to wildlife than Alternative B, which prohibits range improvements of any kind. Alternative C would result in more adverse impacts because it does not limit range improvement projects and does not include a requirement that range improvement projects be pursuant to a Comprehensive Grazing Strategy. Livestock utilization levels under Alternative D are the same as under alternatives A and C; however, similar to Alternative B, Alternative D protects wildlife forage resources. This would avoid the adverse impacts under Alternative C, which allows higher forage utilization and does not have wildlife forage protection as an objective.

Similar to Alternative B, Alternative D travel management would be more beneficial to wildlife than Alternative A or C, which do not include such limitations. Travel restrictions would help limit the number of user-created trails and their adverse impacts to ACEC values. Alternatives B and D designation of roads and trails would be followed with implementation-level planning, which would deter user-created routes and unauthorized road expansions that have been allowed to proliferate under current management (Alternative A) or would continue under Alternative C.

Alternatives B and D limit over-snow motorized travel to a snow depth of at least 12 inches; neither Alternative A nor Alternative C include such a limitation. Restricting over-snow travel would beneficially impact vegetation in the area, which would beneficially impact ACEC values.

4.7.5.3.8.6.4. Special Designations

Other than the ACEC, Alternative D does not include special designation management that would impact ACEC values.

4.7.5.3.9. Detailed Analysis of Alternatives – South Pass Historic Mining Area

In the 1960s and 1970s, there was a concerted effort to save the historic mining towns and sites in the historic South Pass gold mining area. The State of Wyoming purchased South Pass City, and the BLM began to develop the historic mining area as a historical, recreational, and scenic destination. Under all alternatives, the BLM would work with the State of Wyoming Abandoned Mine Division to reclaim or stabilize abandoned mine safety and environmental hazards in the South Pass area that pose a danger to the public. The BLM acquired several abandoned structures and partially stabilized them, including the ghost town of Miner’s Delight, and developed campgrounds and access roads in the area. There was preservation work in the 1980s, especially at Miner’s Delight.

Adverse impacts to important historical resources in the South Pass Historic Mining Area ACEC would typically result in a loss of integrity of the resource, or in some cases, in a loss of information. Adverse impacts to significant historical resources in the mining area may occur in several ways, including actions that physically damage or destroy all or parts of a historic site; actions that alter a significant element of a site or landscape; actions that introduce visual, atmospheric (air), or audible (noise) elements that can diminish the historical integrity of a site or the area; or a lack of action, which would cause a historical resource to deteriorate. Adverse impacts may also result from increases in access to areas that contain historical resources and structures, resulting in increases in use, erosion, looting, and vandalism.

The South Pass Historic Mining Area ACEC is significant for its associations with important events in American history, and for its good historical settings, which help visitors imagine what it was like in the area during the mining booms of the mid to late 1800s. Adverse impacts to these values may occur as a result of the actions described above, and impacts can be short- and long-term because some impacts can be reversed while others cannot. In some cases, the area's historical resources are also significant for their scientific data potential. Actions that cause physical damage or destruction, and sometimes neglect, can adversely impact these resources. Adverse impacts to these types of resources would be long-term because once they are damaged or disturbed, impacts cannot be reversed.

Special management measures that might enhance the quality of resources would result in beneficial impacts to the South Pass Historic Mining Area ACEC. Data recovery, stabilization and repair of historic structures at Miner's Delight, and fencing at gravesites near Miner's Delight and South Pass City are examples of beneficial impacts. Most of these beneficial impacts would be long-term, but eventually, adverse natural and/or human influences would require more measures to keep these resources from degrading.

Alternative D manages some of the area designated as an ACEC under Alternative A and Alternative B, as an ACEC to support heritage and recreation management of the Congressionally Designated Trails and their settings. Because the ACEC designation would be to support the trails, the analysis of the impacts from ACEC management under Alternative D, with comparisons to impacts under alternatives A, B, and C, is provided in the *Congressionally Designated Trails* sections.

4.7.5.3.9.1. Summary of Impacts

Impacts to the South Pass Historic Mining Area ACEC would vary by alternative in the following ways: Alternative C would have the most adverse impact because it would authorize more surface-disturbing mineral and realty actions that would damage the historic mining resources and their setting including from exploratory actions that would disturb less than 5 acres; Alternative A would allow the next most disturbance followed by Alternative D; Alternative B would result in the fewest adverse impacts because it has far more limits on surface disturbance.

Alternative A would retain the existing ACEC and provide moderate to good protection for many of the historic values in the area. Alternative B would extend those protections by enlarging the ACEC to include historic sites along and between Rock Creek and Willow Creek. In addition, Alternative B would also provide for more intensive management of the historic sites in the existing ACEC and the expanded area. Alternative C does not designate any portion of the South Pass area as an ACEC and would not provide much protection for the historic resources in the historic mining area. Alternative D would incorporate the old South Pass Historic Mining Area ACEC and additional nearby lands into a new ACEC (the South Pass Historical Landscape ACEC) for lands along the Congressionally Designated Trails that have the potential to experience adverse impacts from mining. Alternative D would extend ACEC management to a larger area than the other alternatives, however, it has fewer prescriptions than Alternative B.

4.7.5.3.9.2. Impacts Common to All Alternatives

Standard procedures have been developed to help address adverse impacts to significant historical resources. Standard BLM cultural resource management and protection procedures, guided by cultural resource laws such as the NHPA and the ARPA include archival research, on-the-ground inventories, site recordation and evaluation, avoidance, data recovery excavations, condition assessments, stabilization, and historical research. These standard procedures have protected historical resources in the South Pass Historic Mining Area from damage. If protection is not feasible, the standard procedures provide for the recordation of architectural data and/or the collection of archeological data that documents information on the peoples who once lived in this area. All of the alternatives would be guided by these standard procedures.

Standard procedures sometimes do not protect all types of cultural resources. Development projects that directly impact cultural resources can impact resources where the setting is important. For example, projects that intrude on historic settings can adversely impact historic sites with historical settings (such as South Pass City and Miner's Delight). A modern powerline or open-pit gold mine built near South Pass City would affect the historical setting of the town, and would adversely impact its historical integrity.

Another type of adverse impact on historic resources common to all alternatives would be from increased public use of lands, which can occur for several reasons. One is improved access to formerly remote areas. This is common in areas where development allows for the creation of new roads. Another reason is the increased popularity and availability of OHVs, which also allow access to formerly remote areas. A third reason is increased public interest in specific historic sites or areas. As public use of lands increases, so can the adverse impacts to historic resources. As more use occurs, more sites in the South Pass Historic Mining Area are visited or driven over. Some of these resources have been looted or vandalized. This impact would occur under any of the alternatives because access, OHV use, and public use and interest in the South Pass Historic Mining Area are all expected to increase.

A beneficial impact common to all alternatives would be the indirect protection provided by management for greater sage-grouse. While the acres vary by alternative, management that limits surface disturbance in the Wyoming Governor's Sage-grouse Core Area would result in secondary beneficial impacts to ACEC values. Approximately 40 percent of the South Pass Historic Mining Area is in the Core Area (see the *Special Status Species – Wildlife* section and the sections below). Fire suppression activities in this ACEC, including the use of heavy equipment, does not vary by alternative. Therefore, the adverse and beneficial impacts of that management would not vary and are not further analyzed here. There are several pre-FLPMA withdrawals in the South Pass Historic Mining Area that protect historical resources (such as Miner's Delight and around South Pass City) and offer protection from the impacts of mining. These withdrawals do not vary by alternative and are not further analyzed here

AML protections in the South Pass area that provide for public health and safety are the same under all the alternatives.

4.7.5.3.9.3. Alternative A

4.7.5.3.9.3.1. Program Management

The 1987 RMP and EIS ROD designated 12,576 acres as the South Pass Historic Mining Area ACEC. ACEC management includes restrictions on activities such as oil and gas development and land sales and exchanges; requires Plans of Operation for mining exploration activities; conforms with South Pass City zoning ordinances; includes further stabilization and research at Miner's Delight; and retains the rustic character of the historic mining area. This management has largely succeeded in maintaining the historic character and setting of the South Pass Historic Mining Area ACEC, which has resulted in beneficial impacts to ACEC values that would continue into the future.

4.7.5.3.9.3.2. Resources

Air quality management under Alternative A would result in neutral or slightly adverse impacts to the South Pass Historic Mining Area ACEC. Efforts to maintain air quality in the area would help maintain its important qualities. However, degradation in air quality would result in adverse impacts to ACEC values. Alternative A management of soil and water resources would result in beneficial impacts to ACEC values to the extent that management limits surface disturbances. Other limitations on surface disturbances for the benefit of wildlife and special status species would protect the historic setting. Alternative A would limit surface disturbance within ¼ mile of a greater sage-grouse lek and does not limit the number of disturbances or cap acres of disturbance for the benefit of greater sage-grouse. Therefore, Alternative A would result in only a limited benefit to the South Pass Historic Mining Area ACEC.

VRM Class ratings that protect natural viewsheds by limiting surface disturbance would also protect South Pass Historic Mining Area ACEC values. Alternative A would manage most of the ACEC as VRM Class II, which would substantially limit surface-disturbing activities that would adversely impact the South Pass Historic Mining Area ACEC. Alternative A manages the area outside the Class II area as Classes III and IV, which would allows many more intrusions, and therefore would result in more adverse impacts to the ACEC, especially from modern disturbances and intrusions that would be visible from the south. Therefore, Alternative A VRM management to protect natural viewsheds would result in beneficial and adverse impacts.

Alternative A restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) would provide additional protections for South Pass Historic Mining Area resources.

4.7.5.3.9.3.3. Resource Uses

Alternative A provides the South Pass Historic Mining Area ACEC limited protections from the adverse impacts of locatable mineral exploration. The protections afforded by requiring a Plan of Operations are more important in the South Pass Historic Mining Area ACEC than in other ACECs because mining operations in the area have historically been smaller than 5 acres. The Plan of Operations, thus, provides meaningful protections to the historic features and their setting. Alternative A leasable fluid minerals management would prevent surface disturbance with NSO stipulations, which would have a beneficial impact to the ACEC. Alternative A would open the South Pass Historic Mining Area ACEC for leasable solid minerals exploration. However, the historic mining area is not located in proximity to any known leasable solid minerals exposures, so adverse impacts to the ACEC from this type of activity would be unlikely. Mineral material disposals are not precluded, but it is unlikely that such sales would be authorized if adverse impacts to historic resources would result.

The South Pass Historic Mining Area would be avoided for highly visible ROW projects, such as wind-energy developments, gas plants, power plants, and large transmission lines which would benefit the ACEC. The area has high potential for commercial wind-energy development and this management would have important beneficial impacts to the historic resources and their setting.

Livestock grazing management would not preclude adverse impacts to the historic setting through development of range improvement projects.

4.7.5.3.9.3.4. Special Designations

Under Alternative A, the South Pass Historic Mining Area is an ACEC. Other special designation management in the area is an ACEC of ¼-mile buffer around the Congressionally Designated Trails and the Red Canyon ACEC. While these ACECs are not contiguous with the South Pass Historic Mining Area ACEC, their management would limit ROWs which would beneficially impact the South Pass Historic Mining Area ACEC by limiting demand for ROWs through the South Pass area.

4.7.5.3.9.4. Alternative B

4.7.5.3.9.4.1. Program Management

Compared to Alternative A, Alternative B increases proactive management. Alternative B would expand the existing ACEC to cover additional significant historic resources, and would give more attention to the protection and recreational uses of the historic resources in the South Pass Historic Mining Area ACEC.

4.7.5.3.9.4.2. Resources

Alternative B specifies that air quality management would reduce emissions and improve air quality. This action would beneficially impact the ACEC more than management under Alternative A.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) would be greater under Alternative B, would provide additional protection for South Pass Historic Mining Area resources, and would reduce adverse impacts compared to Alternative A. Alternative B management of greater sage-grouse would restrict surface disturbance in more areas of the South Pass Historic Mining Area ACEC than Alternative A. Alternative B manages the entire existing ACEC and the proposed expanded ACEC as VRM Class II, which would substantially reduce adverse impacts from visual intrusions into the historic setting compared to Alternative A.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are greatest under Alternative B, provide additional protection for South Pass Historic Mining Area resources, and would reduce adverse impacts compared to Alternative A.

4.7.5.3.9.4.3. Resource Uses

Alternative B proposes to withdraw all of the existing and expanded ACEC from locatable minerals entry which would result in more beneficial impacts than Alternative A. Beneficial impacts from this management could be substantial because of locatable mineral potential (this is an ACEC because of historic mining). Modern, mechanized mining would adversely impact ACEC values because it would adversely impact the historic setting. Withdrawal would not preclude casual use by nonmechanized recreational gold panners or mining by claimants with valid existing rights. Compared to Alternative A, Alternative B closes the existing and expanded ACEC to leasable fluid/solid minerals and mineral materials exploration and development, or imposes major constraints on those activities. This would protect the South Pass Historic Mining Area from potential disturbances over more area. Alternative B restricts industrial wind-energy development, power and gas plants, and large ROWs to a greater extent and over a larger area than Alternative A. Alternative B would manage the ACEC as an exclusion area for ROWs and would protect the South Pass Historic Mining Area from the impacts of wind-energy development, large mines, and ROWs. Alternative B would result in considerably more beneficial impacts to the area than Alternative A, particularly regarding large ROWs, because these projects could be allowed under Alternative A if South Pass could not be avoided.

Alternative B would not authorize range improvement projects that would adversely impact the historic setting. Therefore, livestock grazing management would be more beneficial to South Pass Historic Mining Area ACEC values.

4.7.5.3.9.4.4. Special Designations

Alternative B would expand the South Pass Historic Mining Area ACEC to include more historic sites near Willow and Rock creeks. This would enhance protection of the general mining area by reducing the potential for adverse impacts to its intact historical settings. This alternative provides better protection for the historic mining area than Alternative A. In addition, other special designations under Alternative B, such as the Government Draw/Upper Sweetwater Sage-Grouse ACEC would limit or close surrounding areas to surface disturbance and would manage more areas as VRM Class II. This would beneficially impact the South Pass Historic Mining Area values of concern.

4.7.5.3.9.5. Alternative C

4.7.5.3.9.5.1. Program Management

Alternative C includes less proactive management than Alternative A. Alternative C would apply the minimum actions necessary to comply with regulations, which would increase adverse impacts to the historic mining area. Alternative C does not designate any portion of the South Pass area as an ACEC and would manage the area with standard stipulations.

4.7.5.3.9.5.2. Resources

Alternative C air quality management would be the same as management under Alternative A, and would result in the same minimally adverse impacts to the South Pass Historic Mining Area. Because Alternative C does not designate the area as an ACEC and places a greater emphasis on resource use, it would place fewer restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations). This management would result in more adverse impacts to the mining area's historical resources than alternatives A and B.

Alternative C would manage the South Pass Historic Mining Area as VRM Class III, and the surrounding areas as Class IV. This management would allow far more surface disturbance than is allowed under any other alternative, with commensurate adverse impacts to the historical setting.

4.7.5.3.9.5.3. Resource Uses

Alternative C would provide minimal protection from the impacts of locatable mineral entry. Alternative C only prevents undue or unnecessary degradation. It does not require a Plan of Operations unless the mining project would disturb more than 5 acres; therefore, new and relatively uncontrolled mining operations could adversely impact historic sites in the mining area. There is high potential for locatable minerals in the area, including iron and gold. The absence of a requirement for Plans of Operation would result in particularly adverse impacts to the historic setting; as many of these prospects would be smaller than 5 acres, but would have locatable minerals potentials high enough for claimants to want to use mechanized equipment that could substantially disturb the surface. Under Alternative C, adverse impacts to the South Pass Historic Mining Area from leasable fluid minerals, leasable solid minerals, mineral materials disposals, wind-energy development, gas and power plants, and large ROWs would be similar to impacts from locatable minerals entry although the area is low potential for leasable minerals.

Wind-energy development, large ROWs, and mineral materials disposals would be the most likely to result in adverse impacts. There is outstanding wind energy potential nearby, with a related demand for ROWs. In addition, there could be increased demand because the areas immediately to the north (Red Canyon and the Lander Slope) are also open to ROWs. Therefore, Alternative C would be much more likely to result in adverse impacts than Alternative A, and substantially more likely than Alternative B.

4.7.5.3.9.5.4. Special Designations

Under Alternative C, there are no special designations other than Congressionally Designated Trails which are protected by a ¼-mile buffer. To support the emphasis on resource use under Alternative C, development outside the ¼-mile buffer around trails would be authorized, including industrial wind-energy development that would be within the viewshed of historic sites. In addition, demand for ROWs to support activities in the Red Canyon and Lander Slope areas would be higher because these areas are managed with standard stipulations under Alternative C, rather than avoided as under Alternative A, or closed as under Alternative B. Alternative B's other special designations would result in far more beneficial impacts than Alternative C.

4.7.5.3.9.6. Alternative D

4.7.5.3.9.6.1. Program Management

Alternative D would include more proactive management than alternatives A and C. Alternative D would designate all of the original South Pass Historic Mining Area ACEC, as well as additional lands, as a new ACEC: the South Pass Historical Landscape ACEC. Alternative D would manage 124,229 acres in this historic landscape ACEC for the protection and recreational uses of the historic resources within the broad South Pass area.

4.7.5.3.9.6.2. Resources

Alternative D would manage air quality similar to alternatives A and C and would therefore result in modestly fewer beneficial impacts than Alternative B. Alternative D water, soil, and vegetation management would be the same as Alternative A and would result in the same moderate beneficial impacts. Alternative D wildlife management is more protective of resources than Alternative A, but less protective than Alternative B, therefore, Alternative D beneficial impacts to historic resources would fall somewhere between the beneficial impacts of alternatives A and B, and would be substantially greater than under Alternative C. The greatest beneficial impacts to ACEC values would result from management for the protection of greater sage-grouse. Although Alternative D does not designate a large sage-grouse ACEC, it would prohibit or severely limit surface disturbance in the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area, a portion of which overlaps the South Pass Historic Landscape ACEC. The Reference and Education Area also limits disturbance to the north of the ACEC, which would protect the visual resources around the ACEC and limit demand for ROWs through the ACEC. In addition to the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area, parts of the ACEC contain greater sage-grouse Core Area, and thus substantially limits surface disturbance which would result in beneficial impacts to ACEC values.

Extending the boundaries of the South Pass Historical Landscape ACEC past South Pass Historic Mining Area ACEC boundaries would increase the area managed as VRM Class II, which would preclude more surface disturbance and allow fewer developments that contrast with the historic setting. This would result in more beneficial impacts to historic resources than Alternative A, and almost as many beneficial impacts as Alternative B. Alternative C would result in a greater amount of adverse impacts than Alternative D.

4.7.5.3.9.6.3. Resource Uses

Alternative D would include the same prescriptions for locatable minerals entry and leasable minerals as Alternative A, which retains existing mineral withdrawals and requires a Plan of Operations for locatable mineral exploration, except that the requirement for a Plan of Operations and NSO management is extended to a larger area. This management would provide substantially less protection than Alternative B, which proposes to withdraw the entire area, and substantially more protection than Alternative C, which opens the entire area to exploration under standard mining regulations. Alternative D would close the portion of the ACEC that overlaps the Reference and Education Area to geophysical exploration. Alternative D prescriptions for non-energy leasable minerals, major mineral materials disposals, and major ROWs would close the area unless VRM objectives were met. This is somewhat more protective of historic resources than Alternative A, less protective than Alternative B, and more protective than Alternative C.

4.7.5.3.9.6.4. Special Designations

Alternative D would incorporate the existing South Pass Historic Mining Area ACEC into the newly proposed South Pass Historical Landscape ACEC, which would extend south toward the Congressionally Designated Trails ACEC. This would enhance protection of the general mining area by reducing the potential for adverse impacts to its intact historical settings. This alternative would provide better protection for the historic mining area than alternatives A and C, but less than Alternative B.

Other special designations under Alternative D would beneficially impact historic and recreational resources in the ACEC. Protective management for the Congressionally Designated Trails would limit visual intrusions into the historic setting and preclude large-scale ROWs, such as industrial wind-energy developments and transmission lines, outside the ACEC. In addition, the Alternative D designation of the Lander Slope and Red Canyon as ACECs, which are exclusion areas for major ROWs, would help reduce the demand for ROWs through the South Pass area.

4.7.5.3.10. Detailed Analysis of Alternatives – National Historic Trails

See the *Congressionally Designated Trails* sections for a discussion of the impacts related to the NHTs ACEC.

4.7.5.3.11. Detailed Analysis of Alternatives – Continental Divide National Scenic Trail

See the *Congressionally Designated Trails* sections for a discussion of the impacts related to the CDNST ACEC.

4.7.5.3.12. Detailed Analysis of Alternatives – Cedar Ridge

Located in northeastern Fremont County and northwestern Natrona County, the regionally significant prehistoric site of Cedar Ridge is a spiritual/sacred/traditional site very important to the cultural continuity of several Native American tribes. This extensive site was first studied and recorded in the 1990s, and was recognized by BLM and the Wyoming SHPO as a TCP soon after. Most of the property is in the Casper Field Office planning area, but a small part of it extends into the Lander Field Office planning area. The Casper 2007 RMP designated Cedar Ridge as a Management Area, with special provisions to protect the TCP and its surroundings.

The Cedar Ridge site is significant for two reasons: it contains important spiritual/religious associations and has scientific data potential. Impacts to the site may result from actions that (1) physically damage the site; (2) alter a significant element or elements of the site; (3) introduce visual, atmospheric (air), or audible (noise) elements that diminish the integrity of the site and its surroundings; and (4) increase access to more parts of the site, resulting in increases in use, erosion, looting, and vandalism. Impacts may also result from a lack of management actions, which would allow the site to deteriorate. Adverse impacts can result in a loss of integrity and/or information of the resource, and are considered long-term because, generally, they cannot be reversed.

Beneficial impacts may result from special management measures that enhance the quality of the site. Closure of trails and roads that run through the site's special features, and stabilization of features that have been disrupted are ways to introduce beneficial impacts by improving site setting and features. Most of these beneficial impacts would be long-term, but eventually, adverse natural and/or human influences would require more measures to keep the site from deteriorating.

4.7.5.3.12.1. Summary of Impacts

Impacts to Cedar Ridge would vary by alternative in the following ways: alternatives A and C are similar in their protections, however, Alternative A would offer more protection than Alternative C and would be likely to result in somewhat fewer adverse impacts to Cedar Ridge. Both alternatives focus on protecting the immediate Cedar Ridge TCP, but do not address impacts farther away from the TCP, referred to as the “periphery,” which is not only the setting for the TCP but also contains important cultural resources. Both would have more adverse impacts than Alternative B or D. Alternative B would provide greater protection for the TCP and protect the natural and historic setting of the area to a moderate to high degree and thus, would result in the most beneficial impacts to values of concern. Alternative D would provide fewer protections for the TCP and its setting than Alternative B, but more protections than Alternative A, and substantially more than Alternative C. While Alternative B would manage 6,784 acres around the TCP as a periphery buffer; Alternative D would specifically manage 3,284 acres around the TCP as the periphery. Accordingly, Alternative D would result in more beneficial impacts to the TCP's setting (and the cultural resources located in the periphery) than Alternative A or C, but less than Alternative B.

4.7.5.3.12.2. Impacts Common to All Alternatives

The lands to the west and southwest of Cedar Ridge have long been developed to extract and transport oil and gas resources, resulting in numerous wells, roads, pipelines, powerlines, and gas plants. To the south, major utility corridors have also been established and contain large pipelines and transmission lines. These developments are visible from the top of Cedar Ridge, and have likely resulted in adverse impacts to the natural viewshed that originally made Cedar Ridge a highly important spiritual site for Native Americans. Adverse impacts to the natural viewshed would continue as long as oil and gas production continues in these areas.

Fire suppression management, including the use of heavy equipment, would be similar under all alternatives, so impacts to the TCP would the same. All alternatives would protect Cedar Ridge ACEC values.

Cedar Ridge is not in the greater sage-grouse Core Area. Therefore, there would be no impacts to Cedar Ridge from the management of greater sage-grouse habitat under the alternatives.

Mineral management would vary by alternative, although all alternatives would include minimal protections required by the NHPA. However, Cedar Ridge is in an area with low potential for minerals and the potential for adverse impacts would be minimal. Therefore, mineral management is not further analyzed.

Wind-energy development and related transmission lines would result in adverse impacts to the Cedar Ridge setting. However, Cedar Ridge is in a low potential area where wind-energy development is unlikely. Accordingly, although wind-energy management varies by alternative, there would likely be no difference in the impacts by alternative.

The alternatives do not vary in their recreation or comprehensive travel management. All alternatives would allow livestock grazing, so impacts from grazing are not analyzed. The alternatives would vary in the way range improvement projects are managed and the resulting impacts are described below.

The Cedar Ridge site and its surroundings are not within any existing ACECs, Congressionally Designated Trails, or WSAs. Cedar Ridge is located far enough away from ACECs under any alternative to be beneficially impacted. Accordingly, special designation management does not vary by alternative except as to whether or not Cedar Ridge and its periphery are designated as an ACEC.

4.7.5.3.12.3. Alternative A

4.7.5.3.12.3.1. Program Management

Awareness of the importance of Cedar Ridge to Native Americans is recent. Therefore, there has been no proactive management of Cedar Ridge in the past. Future program plans proposed under Alternative A would be to maintain the existing condition of the site and its immediate surroundings, without ACEC management of Cedar Ridge or any special management for the area in the periphery around it.

4.7.5.3.12.3.2. Resources

Air quality management under Alternative A would result in a neutral or slightly adverse impact to Cedar Ridge by allowing activities that could degrade the viewshed and historical setting. Efforts to maintain air quality around Cedar Ridge would help maintain its important natural qualities, but if air quality degradation occurred, it would adversely impact the natural character of the site. Soil and water management under Alternative A, with standard stipulations would result in little beneficial impact to Cedar Ridge. This management in the past has not prevented degradation of the visual setting of the TCP. This downward trend would be likely to continue under Alternative A, although it could moderate with the fairly recent understanding of the importance of the TCP.

Alternative A management of wildlife and special status species would result in very little beneficial impact to Cedar Ridge. The ¼-mile raptor buffer would likely not prevent future adverse impacts to Cedar Ridge, because it has not prevented development in the past that adversely impacted Cedar Ridge's setting. There is very little area around Cedar Ridge that is precluded from development for the protection of sage-grouse habitat. VRM that protects natural viewsheds can protect cultural resource sites where the setting is considered important. However, under Alternative A, the Cedar Ridge site is management as Class II, the surrounding area is VRM Class IV and therefore, subject to adverse impacts through the addition of modern intrusions.

4.7.5.3.12.3.3. Resource Uses

Highly visible ROWs and projects, such as mines, gas plants, power plants, and large transmission lines, would (and already have) resulted in adverse impacts to Cedar Ridge in several different ways. New large and visible projects could adversely impact the setting of the Cedar Ridge area, and Alternative A does not include protections from the impacts of these types of projects.

Range improvement projects could adversely impact Cedar Ridge itself or the periphery, if placement were not controlled to project TCP values and setting.

4.7.5.3.12.3.4. Special Designations

See *Impacts Common to All Alternatives*.

4.7.5.3.12.4. Alternative B

4.7.5.3.12.4.1. Program Management

Alternative B would provide for a very high level of program management compared to Alternative A. Alternative B would designate the Cedar Ridge site and the area within a 3-mile radius as an ACEC with protective prescriptions for 7,039 acres.

4.7.5.3.12.4.2. Resources

Alternative B would specify that air quality management reduce emissions and improve air quality. This action would beneficially impact Cedar Ridge compared to the less beneficial management under Alternative A, although the difference is likely to be minimal. Alternative B water and soils management would be more beneficial to Cedar Ridge because the alternative closes a larger area to surface disturbance to protect these values. The more area closed to surface disturbance around Cedar Ridge, the more beneficial the impacts to the TCP would be. Alternative B wildlife management in the Cedar Ridge area is more protective of values of concern because a ¾-mile buffer would be closed to surface disturbance and would preclude adverse impacts to the historical setting.

Alternative B would result in similar adverse impacts as Alternative A because development is not precluded to protect habitat.

Alternative B would result in greater beneficial impacts to the TCP values than Alternative A, which manages the TCP and periphery area as VRM Class IV. Alternative B VRM Class II objectives would prevent most adverse impacts to the TCP setting, including future disturbances that could further disrupt its natural setting.

4.7.5.3.12.4.3. Resource Uses

Alternative B would protect more land around Cedar Ridge from the impacts of large ROWs (e.g., power plants, and gas plants) than Alternative A. This would protect more cultural resources from potential disturbances than Alternative A. Given the low mineral potential in the area, excluding large ROWs would result in substantially more beneficial impacts than Alternative A, because large ROWs would be the most likely intrusion into the setting that would be likely to occur.

4.7.5.3.12.4.4. Special Designations

See *Impacts Common to All Alternatives*.

4.7.5.3.12.5. Alternative C

4.7.5.3.12.5.1. Program Management

Alternative C would maintain proactive management in a similar level as Alternative A. Both alternatives provide for a very low level of management for Cedar Ridge that would likely continue the downward trend in its values of concern that have been observed over the last 30 years.

4.7.5.3.12.5.2. Resources

Alternative C, like Alternative A, would allow adverse impacts to air quality (although not below state standards) which would have a minor adverse impact to the historical setting. Alternative C would include the same prescriptions for air quality and fire and fuels management as Alternative A, and would result in the same adverse impacts to Cedar Ridge. Alternative C wildlife management would be similar to Alternative A, with similar, moderately adverse impacts to values of concern.

Alternative C VRM would be the same as Alternative A (VRM Class IV, in which major modifications of the existing landscape are allowed). Similar to Alternative A, Alternative C would result in adverse impacts to the setting, and those impacts would be greater compared to impacts under Alternative B.

4.7.5.3.12.5.3. Resource Uses

Highly visible projects, such as mines, gas plants, power plants, and large transmission lines, would adversely impact Cedar Ridge. Similar to Alternative A, Alternative C would not include protections from these types of projects. The potential for adverse impacts from this management would be much greater than under Alternative B. Range improvement projects could, like under Alternative A, adversely impact Cedar Ridge and its periphery, if located in a way that would adversely impact the setting and TCPs.

4.7.5.3.12.5.4. Special Designations

See *Impacts Common to All Alternatives*.

4.7.5.3.12.6. Alternative D

4.7.5.3.12.6.1. Program Management

Alternative D does not designate any part of Cedar Ridge or its surroundings as an ACEC. This alternative would manages the 255 acres of the TCP with prescriptions that are basically the same as those adopted by the Casper Field Office in 2005, for the portion of Cedar Ridge in the Casper Field Office planning area. Alternative D would include special prescriptions for 3,284 acres in the periphery around Cedar Ridge, slightly less than half of the periphery area specially managed under Alternative B. Unlike Alternative B, Alternative D would specially manage the periphery with less restrictive prescriptions than in the TCP.

4.7.5.3.12.6.2. Resources

Alternative D manages air quality the same as alternatives A and C, which would result in fewer beneficial impacts to Cedar Ridge than Alternative B. Alternative D water and soil management would be more similar to alternatives A and C than to Alternative B, which closes more area to surface disturbance to protect TCP values. The more area that would be closed to surface disturbance around Cedar Ridge, the more beneficial the impacts to the TCP.

Alternative D VRM would result in greater beneficial impacts to TCP values than Alternative A or Alternative C although somewhat less beneficial than Alternative B, because the Alternative D periphery would be smaller and managed as VRM Class III. VRM Class III would allow more development that would adversely impact the setting than Alternative B. Whether this difference would be substantial would depend on the proposed activities on a site-specific basis. Class II VRM objectives would prevent most of the adverse impacts to the TCP setting, including future disturbances that could further disrupt the natural setting of Cedar Ridge.

4.7.5.3.12.6.3. Resource Uses

Alternative D manages Cedar Ridge and lands around it the same as alternatives A and C for locatable mineral entry, which would be much less beneficial than the withdrawal under Alternative B. The difference in impacts among the alternatives might mean little because the potential for locatable minerals around Cedar Ridge is low and the likelihood of impacts from locatable mineral entry would be remote. Alternative D would be more similar to Alternative B in its management of leasable minerals and mineral materials disposals, than to Alternative A or C. Within the 255 acres of the TCP, Alternative D management would maintain an NSO restriction, not closed as under Alternative B. However, the NSO restriction would still beneficially impact TCP values. In the smaller periphery, Alternative D protects the TCP setting with CSU management and adverse impacts would be avoided or mitigated. This smaller area and lower level of protection would result in more adverse impacts than the Alternative B extension of an NSO restriction to a larger periphery. The impact of this difference would depend on the extent of demand for mineral development as mineral potential in the Cedar Ridge area is considered low. Alternative D would result in substantially more beneficial impacts than alternatives A and C.

Similar to Alternative B, Alternative D would protect TCP values by managing the TCP as an exclusion area for major ROW projects, including wind-energy development. Alternative D would manage the periphery as an avoidance area for ROWs, rather than an exclusion area similar to Alternative B however, the VRM Class III objectives for the periphery would be likely to limit adverse impacts from large visual intrusions such as wind turbines. Alternatives B and D would result in greater beneficial impacts than alternatives A and C, which do not preclude these types of developments and under which VRM management (Class IV) would allow them.

4.7.5.3.12.6.4. Special Designations

See *Impacts Common to All Alternatives*.

4.7.5.3.13. Detailed Analysis of Alternatives – Castle Gardens

Located in eastern Fremont County, the regionally significant prehistoric rock art site of Castle Gardens is a classic example of Plains-style incised shield and representational rock art of the Late Prehistoric period. This extensive petroglyph/pictograph site was first studied and recorded in the 1930s, and was written about in regional newspapers. By the 1950s, this site had become well known, but was also suffering from major vandalism and theft. The BLM and the National Park Service developed and implemented a site protection plan in the 1970s that included fencing around the rock art panels, a parking lot, toilets, picnic benches, a small amount of interpretative information, and fencing around the general site area.

The Castle Gardens rock art site is significant for several reasons, including its scientific data potential, its unique artistic and representational characteristics, and its important spiritual and/or religious associations. Impacts on the site may include actions that (1) physically damage the site; (2) alter a significant element or elements of the site; (3) introduce visual, atmospheric (air), or audible (noise) elements, which diminish the integrity of the site and its surroundings; and (4) increase access to more parts of the site, resulting in increases in use, erosion, looting, and vandalism. Impacts would also result from a lack of management actions, which may allow the site to deteriorate. These actions result in impacts including the loss of information and/or integrity of the resource. All of these impacts would be long-term because damage or disturbance, generally, cannot be reversed.

Beneficial impacts would result from special management designed to enhance the quality of the site. Management actions that would enhance the quality of the site include stabilizing and repairing petroglyph panels; removing graffiti; removing or reconfiguring fences, walkways, and parking areas to improve the natural setting of the site area; erosion control; and interpretational and educational improvements. Most beneficial impacts would be long-term, but eventually, adverse natural and/or human influences would require additional measures to keep the site from deteriorating.

Castle Gardens and its surrounding periphery is in the Wyoming Governor Core Area.

4.7.5.3.13.1. Summary of Impacts

Impacts to Castle Gardens would vary by alternative in the following ways: Alternatives A and C are similar in their protections, but Alternative A would provide greater protection than Alternative C. Both alternatives focus on protecting the immediate Castle Gardens site area, but do not address impacts farther away from the 80 acre site. Alternative B would provide greater protections for Castle Gardens and its periphery, and would protect the natural and historic setting of the area to a greater degree by designating 8,469 acres, including BLM-administered lands within a 3-mile radius of the TCP as part of an ACEC. Alternative D does not designate any portion of the area as an ACEC and would include management prescriptions to protect Castle Gardens over a much smaller area (1,656 acres).

Beneficial impacts to Castle Gardens would be greatest under alternatives B and D because Castle Gardens and its periphery would have limits on surface disturbance to protect the greater sage-grouse Core Area. Alternative B energy management would be more restrictive, but may not result in more beneficial impacts to Castle Gardens because the area is low to moderate potential. Minimal difference in impacts is anticipated among the alternatives in regard to energy development. Both alternatives would beneficially impact the area by limiting ROWs and other visually intrusive surface disturbance. See the *Special Status Species – Wildlife* section for a detailed analysis of protections by alternative for greater sage-grouse limitations on disturbance. These limits would also benefit Castle Gardens and its periphery.

4.7.5.3.13.2. Impacts Common to All Alternatives

Protective measures instituted in the 1970s and formalized in the 1987 RMP and EIS ROD included fencing an area of approximately 80 acres around the Castle Gardens Rock Art Site and Picnic Area, and restricting mineral and realty actions within the fenced area. These actions protected the immediate site area from development-related impacts. Subsequently, this area was more clearly defined using technological advances and is now known to include 80 acres. However, there are additional sites and art locations in the periphery around the 80 acre site. Protections for the periphery would vary by alternative.

Over the last 10 years, more cultural resources personnel have been available to try and improve management around the Castle Gardens area. During the last 5 years, the BLM has obtained funding to have a conservation expert study and recommend measures to stabilize/repair/improve the site; remove the dilapidated toilet; and inventory the area around Castle Gardens (referred to herein as the periphery; the size of the periphery would vary by alternative) to determine if there is more rock art, or other evidence of prehistoric occupation. Future plans are to consult with Native American groups and eventually write a management plan to improve protection and use of the site as well as the surrounding areas. This basic management does not vary by alternative.

The remaining threat to the rock art site itself, are mostly related to visitor use impacts. There are several reasons for these impacts. Hundreds of people visit the Castle Gardens Rock Art Site and Picnic Area every year. The visitors come to view and learn about the rock art, the natural setting, and the unique landscape of the area. Unfortunately, the site is not well developed or managed, and the lack of planning and attention has adversely impacted the site. For example, no walkways were built and unplanned paths have formed over time, causing erosion along the walkways and near the petroglyph panels. OHV users have gone around parking lot barriers and have caused disturbance and erosion in the site. Fences around the panels designed to protect the petroglyphs are difficult to see through and have been breached. Graffiti has been drawn on top of and around the petroglyphs, and on many of the unfenced rock faces in the area. In addition, the petroglyphs have been chipped out of the rock and stolen. Even with mitigative measures such as those recommended under the various alternatives, these types of impacts are expected to continue to some degree.

The alternatives do not vary in the use of heavy equipment for fire suppression and all alternatives assume that the Fire Program has been made aware of the importance of the cultural properties of Castle Gardens and the periphery around it.

The 80 acres of the Castle Gardens TCP was withdrawn from mineral entry in a pre-FLPMA action that does not vary by alternative. This withdrawal is managed under all alternatives as closing the cultural resources site to all mineral activities. Accordingly, impacts from minerals activities associated with the 80-acre site do not vary by alternative and are identified below only as needed to clarify the impacts analysis. Improved mapping techniques since the 1987 EIS have identified that this area is really 80 acres and the alternatives all use 80 acres as the Castle Gardens site.

Castle Gardens and its periphery have low potential for locatable minerals and phosphate, and moderate potential for oil and gas. The impacts to Castle Gardens (beneficial and adverse) would not be likely to vary in more than a low degree, although management would vary by alternative.

Although Castle Gardens itself has high potential for commercial wind-energy development, BLM obligations under the NHPA and Native American religious protections would preclude development in the 80 acres and probably in the periphery, under all alternatives. Accordingly, there would be no difference in impacts for wind energy management among the alternatives in Castle Gardens and its periphery. Outside this area, the alternatives would vary in the impacts to the setting of Castle Gardens. These differences are discussed under each alternative.

4.7.5.3.13.3. Alternative A

4.7.5.3.13.3.1. Program Management

The 1987 RMP and EIS ROD designated Castle Gardens as a unique management area and restricted most non-recreational uses within an 80-acre area around the main site area. Current management is largely the same, but since the late 1990s, the BLM has become more aware of the importance of Castle Gardens to regional Native American tribes as a spiritual/sacred place. Management is to minimally protect the identified cultural sites in Castle Gardens. The area outside of Castle Gardens but within its viewshed is managed with standard stipulations. Alternative A greater sage-grouse management does not incorporate the Core Area strategy and would have minimal limits on surface disturbance. Therefore, fewer areas in the Castle Gardens viewshed would be protected.

4.7.5.3.13.3.2. Resources

Air quality management under Alternative A would result in neutral or minimal adverse impacts to Castle Gardens. Efforts to maintain air quality around the site would help maintain its important qualities. However, if the air quality degrades, it would adversely impact the site. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, and biological resources) would provide additional minimal protection for Castle Gardens.

VRM Classes that protect natural viewsheds may protect cultural resource sites where the setting is considered important. However, under Alternative A, the Castle Gardens site and its surroundings area is located in Class IV areas, and would be subject to adverse impacts from the introduction of modern intrusions into the historical/natural setting.

4.7.5.3.13.3.3. Resource Uses

Although Alternative A does not limit mineral development in the periphery; as indicated in *Impacts Common to All Alternatives*, this would not likely result in adverse impacts to the cultural resource except to a minimal degree.

Highly visible ROW and development projects, such as wind-energy development, mines, gas plants, power plants, and large transmission lines, would adversely impact Castle Gardens in several different ways. Although these activities are prevented in the immediate site area, these large and visible projects would adversely impact the historical/natural setting of the Castle Gardens area. For example, an industrial wind-energy development or gas plant near the Castle Gardens site would adversely impact the site's value to Native American tribes. Alternative A does not protect the site's setting from these types of projects.

4.7.5.3.13.3.4. Special Designations

The Castle Gardens site and its surroundings are not located within any existing ACECs and are not protected by any management for Congressionally Designated Trails, WSAs, or WSRs.

4.7.5.3.13.4. Alternative B

4.7.5.3.13.4.1. Program Management

Alternative B would designate an 8,469 acre ACEC including Castle Gardens and the BLM-administered lands in a 3-mile radius around it as an ACEC. Alternative B would provide for more proactive management than Alternative A. This alternative would increase the focus on revamping public use of the area to better protect the site, enhance the natural character of this area, and increase public enjoyment of the site.

4.7.5.3.13.4.2. Resources

Alternative B would specify that emissions be reduced to improve air quality. This action would beneficially impact Castle Gardens and would be more beneficial to the site than management under Alternative A. Alternative B would extend raptor protections over a greater area, which would result in more beneficial impacts than under Alternative A. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources) would be greatest under Alternative B, providing additional protections for Castle Gardens and reducing the potential for adverse impacts to the extent that those protections would limit surface disturbance within Castle Gardens setting. Alternative B greater sage-grouse management limits surface disturbance to a far greater extent than Alternative A with beneficial impacts to Castle Gardens setting.

Alternative B would classify much more land around Castle Gardens as VRM Classes II and III than Alternative A. This would better protect the site from the introduction of development that would be out of character with the area's historical/natural settings.

4.7.5.3.13.4.3. Resource Uses

Alternative B protects more lands around Castle Gardens from the impacts of locatable mineral entry than Alternative A (8,469 acres, including the 80 acres that do not vary by alternative), which would protect more cultural resources from potential disturbances than Alternative A.

Alternative B would also protect the 8,469 acres from adverse impacts of leasable fluid/solid minerals development, mineral materials disposals, and large ROWs (e.g., wind-energy developments, power plants, and gas plants). Management under Alternative B would protect more cultural resources from potential disturbance than Alternative A. This protection is most important for oil and gas exploration and large ROWs, which would have the highest potential to occur in the area.

Alternative B ROW management, in general, would result in more beneficial impacts to the Castle Gardens area than Alternative A. Alternative A manages ROWs with standard stipulations; Alternative B manages the area as an exclusion area from major and minor ROWs, which would provide more protections for the individual sites and their settings.

4.7.5.3.13.4.4. Special Designations

Alternative B would designate the Castle Gardens site and the area within a 3-mile radius as an ACEC. This would enhance protection of the site and its surroundings by reducing the potential for adverse impacts to its intact historical and natural settings. This would also provide adequate protection for spiritual values important to Native Americans in this special area. There are no other special designations that would benefit Castle Gardens except to the extent that the RHT&EHs ACEC would protect Castle Gardens's viewshed and setting. Any beneficial impacts could be determined only with a project-specific viewshed analysis.

4.7.5.3.13.5. Alternative C

4.7.5.3.13.5.1. Program Management

Alternative C would maintain the proactive management described for Alternative A, with no portion of the area designated an ACEC. Alternative C manages the 80 acres within the pre-FLPMA withdrawal, but would provide little additional management. In general, the impacts associated with management under Alternative C would be similar to those under Alternative A.

4.7.5.3.13.5.2. Resources

Alternative C air quality, and biological management would be similar to Alternative A, and would result in the same moderate adverse impacts to Castle Gardens. However, there would be fewer beneficial impacts than under Alternative B. Alternative C's greater sage-grouse management would be the same as Alternative A.

Alternative C manages the 80-acre site as VRM Class III rather than Class II as under alternatives A and B, which would result in more adverse impacts by allowing more contrast with the existing landscape. Other management prescriptions for the 80 acres would likely limit the adverse impacts of this less-protective VRM. However, Alternative C would manage the periphery as VRM Class IV, resulting in more adverse impacts to the setting than Alternative B, and somewhat greater adverse impacts than Alternative A. Under Alternative C, most of the area around Castle Gardens would be in VRM Class IV areas, which would provide little or no protection to the historical/natural setting of the site.

4.7.5.3.13.5.3. Resource Uses

Alternative C manages ROWs similar to Alternative A, which would result in the same adverse impacts to Castle Gardens (outside the 80 acres). Both alternatives would result in greater adverse impacts to Castle Gardens than Alternative B depending upon the demand for larger-scale ROWs. Alternative B management of all ROW projects, including large-scale projects such as wind-energy developments, would be more protective and would result in more beneficial impacts than Alternative A or C.

4.7.5.3.13.5.4. Special Designations

Similar to Alternative A, the Castle Gardens site and its surroundings would not be located within any existing ACECs and would not be protected by management for Congressionally Designated Trails, WSAs, or WSRs.

4.7.5.3.13.6. Alternative D

4.7.5.3.13.6.1. Program Management

Alternative D would include more proactive management than alternatives A and C, and would provide a similar level of management as Alternative B. However, Alternative D would not designate the area as an ACEC and would provide protective management to a smaller area (a periphery of 1,656 acres). Similar to Alternative B, Alternative D would increase the focus on revamping public use of the area to better protect the site, enhance the natural character of this area, and increase public enjoyment of the site.

4.7.5.3.13.6.2. Resources

Similar to Alternative B, Alternative D would specify that emissions be reduced to improve air quality. This action would beneficially impact Castle Gardens more than alternatives A and C. Alternative D restrictions on surface-disturbing activities designed to protect other resources (e.g., soil, water, biological resources) would be greater than under alternatives A and C, and similar to, but moderately less, than under Alternative B because less area would be protected. Alternative D greater sage-grouse management would be similar to Alternative B, although less restrictive, which would result in fewer beneficial impacts to Castle Gardens. In light of the limited mineral potential, it is only in the ROW program where this difference could be even moderate.

Alternative D would classify much more land around Castle Gardens as VRM Class II than alternatives A and C, and more than Alternative B. However, Alternative D classifies less land as VRM Class III which would allow far more visually intrusive disturbances than Alternative B. The overall impact of Alternative D would be greater protection for lands closer to the site than the other three alternatives, but less protection than Alternative B for lands farther away. Alternative D would protect most of the sensitive lands from the introduction of development that would be out of character with the area’s historical and natural settings.

4.7.5.3.13.6.3. Resource Uses

Alternative D would include the same management of Castle Gardens and lands around it for locatable mineral entry as alternatives A and C. This management would be much less protective than management under Alternative B, which would require Plans of Operation and would better protect the historic and natural setting around the site. However, the potential for locatable minerals around Castle Gardens is low, so the likelihood of impacts from locatable minerals exploration would be remote.

Alternative D would protects 1,656 acres around the periphery of Castle Gardens from adverse impacts as a result of leasable/solid minerals development, mineral materials disposals, and large ROWs (e.g., wind-energy developments farms, power plants, and gas plants). Alternatives A and C would not protect these acres while Alternative B would protect many more acres (8,391). Alternative D management would protect the majority of the historic and natural setting of the cultural resources from potential disturbance, although not as much as Alternative B. This protection would be most important for oil and gas exploration and large ROWs, which have the highest potential to occur in the area.

ROW management under Alternative D would result in greater beneficial impacts to the Castle Gardens area than Alternative A or C. Alternatives A and C would manage ROWs with standard stipulations, while similar to Alternative B, Alternative D would manage the area as an exclusion or avoidance area for ROWs. This would provide more protections for the individual sites and their settings.

4.7.5.3.13.6.4. Special Designations

Similar to Alternative A, the Castle Gardens site and its surroundings would not be located within any existing ACECs and would not be protected by management for Congressionally Designated Trails, WSAs, or WSRs.

4.7.5.3.14. Detailed Analysis of Alternatives – Sweetwater Rocks

4.7.5.3.14.1. Summary of Impacts

All alternatives would continue to manage the 118,165 acres in the four WSAs in accordance with the IMP. Alternative B would designate 152,347 acres as an ACEC (including the 118,165 acres of the WSAs) and the other alternatives would have varying types of management with no ACEC designation. Alternative C would result in the most adverse impacts because it would allow the most surface disturbance in the ACEC which would adversely impact the viewshed. Alternative A would have fewer adverse impacts, because the Sweetwater Rocks area (which is not defined) would be avoided for ROWs which would limit surface disturbance and degradation of the viewshed. Alternative D would be similar to Alternative A as a result of adverse impacts from livestock grazing. However, Alternative D would have fewer adverse impacts because ROWs would be required to be within the designated corridor except in limited circumstances. Alternative B would be the least adverse because the ACEC designation would have prescriptions designed to prevent almost all surface disturbance in the ACEC. Because of low mineral potential, this difference may be only moderate in impact to values of concern.

There is no difference among the alternatives with regard to WSA management, with the exception of travel management where Alternative B would have greater beneficial impacts. Alternative B would have greater beneficial impacts due to protections for greater sage-grouse, the extensive buffer around the NHTs that would protect the viewshed, and the mineral withdrawal that would limit adverse impacts from mineral material disposals. Alternative D would have a similar greater sage-grouse buffer as Alternative B, but would have fewer limits on surface disturbance to protect the NHTs. However, Alternative D's VRM may limit the difference between the alternatives. There would be very little difference in beneficial impacts to values of concern between alternatives B and D.

4.7.5.3.14.2. Impacts Common to All Alternatives

The Sweetwater Rocks consist of the granite outcroppings visible to the north along Highway 287. The Sweetwater Rocks include four WSAs identified in the 1987 RMP and EIS ROD, which are separated by narrow bands of non-WSA lands. The granite is unusual geologically because it tops an otherwise buried ancient mountain range. See the *ACEC Report* for additional information. The area is an international and national tourist destination, where recreationists, particularly rock climbers, use the area extensively. The values of concern are the view of the Sweetwater Rocks from the south, and the viewshed looking out of the WSAs.

Under all alternatives, limitations on surface disturbance would beneficially impact ACEC values, including viewshed and habitat. Conversely, surface disturbance would adversely impact ACEC values.

Fuels and fire management objectives are the same under all alternatives, although the alternatives would vary in the amount of vegetative treatment within view of the Sweetwater Rocks each year. Forest and grassland-shrubland management would not result in impacts under any alternative. The ACEC is not significant for wildlife values and impacts to these values are not analyzed.

All alternatives would allow livestock grazing. Impacts to the ACEC from livestock grazing would not vary by alternative and are not analyzed.

None of the alternatives analyze whether the granite in the ACEC is subject to claim as a locatable mineral. Such a determination could only be made in response to a specific application when the quality of the granite as a locatable mineral would need to be analyzed. The likelihood of such a proposal is considered low. If a proposal were made, it would need to be evaluated in a site-specific EIS and approved only through an RMP amendment. Although the alternatives would vary in locatable mineral management, because of the low potential, the difference in impacts is anticipated to be minimal and is not analyzed.

Alternative B would designate 152,347 acres as an ACEC which includes the four WSAs as well as the area around them, to protect the view of the Sweetwater Rocks and the view from the WSAs. This area is called “the ACEC” under all alternatives to refer to the same 152,347 acres, although none of the other alternatives would designate this area as an ACEC.

Under alternatives B, C, and D, Lost Creek would be designated as a ROW corridor. Alternative A does not designate Lost Creek as a ROW corridor because it was not addressed in the 1987 ROD. However, Lost Creek is currently managed as a ROW corridor and existing management practice is to co-locate other ROWs with existing ROW. Therefore, Lost Creek is not further analyzed. The alternatives would vary in their management of other ROWs within the ACEC.

4.7.5.3.14.3. Alternative A

4.7.5.3.14.3.1. Program Management

The 1987 RMP and EIS ROD designated four areas in the ACEC as WSAs, but did not apply any special management to the area around the WSAs that make up the rest of the ACEC. The WSAs were found to be significant visual and geologic resources, and the view of the WSAs as well as the view from the WSAs were found to be significant. No portion of the area is managed under an MLP.

4.7.5.3.14.3.2. Resources

Management actions from other programs that protect physical values and viewsheds would directly benefit ACEC values.

Because the view from the ACEC is considered a contributing value, management that protects against INNS infestation would beneficially impact ACEC values. Alternative A would continue vegetative treatments in the ACEC at historic levels. Alternative A would result in more adverse impacts from INNS because it does not require weed-free feed or livestock flushing.

Alternative A wildlife management includes limited protections for greater sage-grouse. The alternative would close ¼ mile around leks to surface disturbance and would not limit the number of energy developments or place caps on surface disturbance in the ACEC or the area outside the ACEC within its viewshed.

Alternative A VRM would result in beneficial impacts to visual and geologic resources in the ACEC by retaining the existing character of the landscape within and adjacent to the ACEC with VRM Class II and Class III management, which should limit visual intrusions and surface-disturbing activities. This would beneficially impact visual resources.

4.7.5.3.14.3.3. Resource Uses

Alternative A manages fluid/solid minerals leasing in the ACEC with standard stipulations and does not require an MLP in any portion of the ACEC. However, the potential for fluid/solid leasable minerals in the area is low to none, as would be expected in light of the ACEC geologic formation as a granite mountain range. Alternative A does not withdraw the ACEC from locatable mineral entry, but there is no identified potential for locatable minerals in the area. If potential were identified, Alternative A would not require Plans of Operation, which would adversely impact ACEC values. Alternative A manages the ACEC to allow mineral materials disposal on a case-by-case basis, which could adversely impact ACEC values. Previous mineral materials disposals have caused irreversible adverse impacts to geologic resources.

Alternative A manages the WSAs and the lands between them as avoidance areas for major ROWs and corridors, which would adversely impact ACEC values when ROWs are authorized. Increasingly, the areas between the WSAs are becoming filled or are otherwise unsuitable for ROW use, but surface disturbance from ROWs could adversely impact the parts of ACEC outside the WSAs. While it is possible that some projects could be sited in a way that would minimize or mitigate adverse impacts, it is more likely that a ROW, particularly a high-profile development such as an industrial wind-energy development, would adversely impact ACEC values if placed near VRM Class II visual resources. The ACEC has high potential for wind-energy resources, the development of which would adversely impact the viewshed.

Alternative A recreation management does not address ACEC values and does not guarantee the recreational setting. Therefore, there would be no beneficial impacts to ACEC values, particularly the view from the WSAs. Alternative A limits motorized vehicle travel to existing roads and trails, which would not protect ACEC values. However, the adverse impact of this management would be minimal because of the limited number of roads in the area.

4.7.5.3.14.3.4. Special Designations

Alternative A manages the four WSAs in accordance with the IMP. There is no other special designation management, including ACEC designation. Alternative A management of the NHTs would not beneficially impact the ACEC because that management primarily prohibits surface disturbance within ¼ mile of NHTs, but in most cases, not beyond. Therefore, it is not anticipated that Alternative A would result in beneficial impacts to the setting of the ACEC.

4.7.5.3.14.4. Alternative B

4.7.5.3.14.4.1. Program Management

Alternative B would designate 152,347 acres as an ACEC for recreation values, unique geological values, and scenic values. Alternative B's management emphasizes resource protections which support values of concern. Alternative B would limit surface disturbance and would provide the most protections for wildlife and cultural resources which beneficially impacts ACEC values. Alternative B would close the entire ACEC to oil and gas leasing and does not require an MLP in any portion of the ACEC.

4.7.5.3.14.4.2. Resources

Alternative B management of air quality, soil, and water resources would limit surface disturbance by expanding the riparian-wetland buffer from 500 feet to 1,320 feet, and would close slopes steeper than 15 percent to surface disturbance. This management would be more beneficial to ACEC values than Alternative A, which restricts surface disturbance in a smaller area. Alternative B would implement a proactive approach to reduce emissions and improve air quality, which could improve the view of the ACEC from Highway 287 and the view from the ACEC. Alternative B would be more proactive in addressing the link between BLM-permitted activity and the spread of invasive plant species. The presence of invasive plant species would adversely impact visual resources, not only because of the different appearance of invasive plant species than native vegetation but because of the more intense fire regimes associated with heavy invasive plant species infestation. Additional impacts from INNS management are discussed below under livestock grazing.

Alternative B wildlife management would result in substantially more beneficial impacts to the ACEC because of protections for greater sage-grouse habitat. The ACEC is in the sage-grouse Core Area and limitations on surface disturbance for the protection of greater sage-grouse would beneficially impact the ACEC viewshed. Alternative B wildlife management closes the ACEC to mineral and realty disturbances and prohibits other surface disturbance, such as range improvement projects, within the lek boundaries. Outside the ACEC, Alternative B would limit the number of mineral leasing and energy ROW projects per section and would apply a cap on surface disturbance.

Alternative B VRM would result in greater beneficial impacts to the ACEC than Alternative A because changes in the characteristic landscape would be low and not attract the attention of the casual observer. This management would limit obtrusive development that would adversely impact the ACEC setting and view.

4.7.5.3.14.4.3. Resource Uses

Alternative B management of locatable, leasable, and mineral materials disposals would be more protective of ACEC values than Alternative A. Alternative B would close the ACEC to all mineral activity, including withdrawing it from locatable mineral entry. The primary benefit of this management would be the protection of ACEC values from adverse impacts of mineral materials disposals. The granite in the ACEC is desirable for AML projects and road building, and additional disposals would result in adverse impacts to the granite in the ACEC and the ACEC viewsheds. Alternative B would result in minimal beneficial impacts from the other minerals management compared to Alternative A because the potential for such minerals is so low.

Alternative B management of wind-energy development and major ROWs and corridors, would be more beneficial to ACEC values than Alternative A, because Alternative B would manage the area as an exclusion area for these realty actions, whereas Alternative A avoids the Sweetwater Rocks area, which is undefined. Demand is anticipated to be moderately high for ROWs.

Alternative B livestock grazing management would be less adverse to values of concern than Alternative A because rangeland health would be achieved through non-infrastructure management. Fences and water developments would cause surface disturbance and tend to concentrate livestock in a manner that could intrude on the views of and from the ACEC. Alternative B could result in more beneficial impacts to vegetation and thus visual resources by allowing the Authorized Officer to require livestock flushing before animals are turned out on public lands, if it appears they have ingested INNS. In addition, the INNS program could benefit from additional vegetation treatments that would be undertaken since range improvement projects under Alternative B would be limited to non-infrastructure projects such as vegetation treatment.

Alternative B recreation management would be similar to Alternative A and would result in similar impacts. Alternative B would limit travel to designated roads and trails, with implementation-level planning to meet management requirements. This would beneficially impact the ACEC, but only in the long term. Alternative B travel management would have modest beneficial impacts to recreation values in the WSAs but would also limit access. The ACEC has few roads so this difference in impacts would be minimal.

4.7.5.3.14.4.4. Special Designations

Alternative B management of other special designations (in addition to the Sweetwater Rocks ACEC) would beneficially impact the viewshed from the ACEC. The entire area around the ACEC would be closed to surface disturbance from mineral development and ROWs because of the management prescriptions for the Government Draw/Upper Sweetwater Sage-Grouse ACEC and the NHT ACEC. This would beneficially impact the ACEC setting more than management under Alternative A. There is uranium potential to the north and east of the Sweetwater Rocks ACEC. It is possible that the Alternative B withdrawal of the greater Government Draw/Upper Sweetwater Sage-Grouse ACEC from minerals development would benefit the Sweetwater Rocks ACEC by limiting disturbance in its viewshed from the development of that uranium. However, that determination would require a site-specific analysis.

4.7.5.3.14.5. Alternative C

4.7.5.3.14.5.1. Program Management

Alternative C would not designate the Sweetwater Rocks ACEC. Rather, Alternative C management would emphasize resource use and could adversely impact the ACEC and its viewshed. Alternative C designates the Lost Creek corridor but would consider other locations for ROW. Alternative C would manage greater sage-grouse similar to Alternative A, although with fewer limits on surface disturbance. Alternative C would not manage any portion of the area under an MLP.

4.7.5.3.14.5.2. Resources

The Alternative C emphasis on resource uses over physical and biological resources would result in more impacts to raptors and the visual and geologic resources in the ACEC. Unlike Alternative B, Alternative C does not proactively manage air quality, and manages water and soil with standard stipulations. INNS management under Alternative C would be comparable to Alternative A and would have fewer beneficial impacts to values of concern than Alternative B. Alternative C wildlife habitat management, particularly for greater sage-grouse, is the same as Alternative A and would not result in similar beneficial impacts as described under Alternative B.

Alternative C VRM in the ACEC and the surrounding area, would result in more adverse impacts to ACEC values than Alternative B, because Alternative C allows changes to the landscape that would adversely impact the viewshed.

4.7.5.3.14.5.3. Resource Uses

Alternative C management of minerals would result in more adverse impacts to ACEC values than either Alternative A or B since the entire area is open to development and an MLP is not required. Alternative C management of major ROWs and corridors, including wind-energy development and transmission lines, would result in more adverse impacts to visual resources than Alternative B, which manages the area as an exclusion area for these developments. The area north of the ACEC has high potential for wind-energy development but it is likely that transmission would travel out to the Casper Field Office. However, demand for pipelines and other ROWs could adversely impact viewshed.

Alternative C could result in fewer beneficial impacts to vegetation because it does not allow the Authorized Officer to require livestock flushing. Since livestock grazing management would continue to develop infrastructure, although at a lower rate than Alternative A, there would be fewer vegetation treatments undertaken than would occur under Alternative B. Alternative C would have the same risk of INNS infestation that is present under Alternative A that is associated with the surface disturbance in constructing infrastructure.

Alternative C does not guarantee recreational setting or experience and therefore would not provide protections to ACEC values. Recreation *per se* would not be expected to result in adverse impacts to ACEC values. Impacts to the ACEC from travel management would be slightly more adverse under Alternative C than Alternative B, and similar to impacts under Alternative A. This impact would be long-term and would not be evident in the short term.

4.7.5.3.14.5.4. Special Designations

Management in general without ACEC designation would result in long-term adverse impacts similar to Alternative A over portions of the ACEC not in the WSAs, although likely more severe because of Alternative C's less restrictive ROW management. See the Alternative B analysis contrasting the Alternative B proactive management and the management under alternatives A and C.

4.7.5.3.14.6. Alternative D

4.7.5.3.14.6.1. Program Management

Alternative D would not designate the area as an ACEC. Program management under Alternative D is very similar to Alternative A except in the portion of the ACEC that is managed with an MLP. The primary differences are that Alternative D would have more limits on authorizing ROWs, limit substantially more surface disturbance to protect greater sage-grouse and limit mineral material disposals to identified existing areas which would all protect values of concern.

4.7.5.3.14.6.2. Resources

Alternative D management of air quality, soil, and water resources would limit surface disturbance in the same way as Alternative A, which would be somewhat less protective of ACEC values than Alternative B. Alternative D would also be more proactive in addressing the link between BLM-permitted activities and the spread of invasive plant species than Alternative A or Alternative C. The presence of invasive plant species would adversely impact visual resources, not only because of the different appearance of invasive plant species than native vegetation, but also because of the more intense fire regimes associated with heavy invasive plant species infestation which would adversely impact visual resources.

Alternative D includes wildlife management that would result in beneficial impacts to the ACEC viewshed similar to Alternative B. The limits on surface disturbance for the protections of greater sage-grouse would make 3,147 acres closed to surface-disturbing activities but to a smaller degree. Alternative D would designate fewer areas as ACECs than Alternative B and the protections for greater sage-grouse habitat under Alternative D would become more important in the protections they afford the Sweetwater Rocks viewshed. Alternative D would limit surface disturbance on 3,147 acres in the ACEC for protection of leks and a substantial number of acres in the viewshed outside the ACEC. While the beneficial impacts of this management would have to be identified in a site-specific analysis, this benefit would likely be substantial because there are a number of leks in the viewshed. In addition, the Alternative D adoption of the Core Area concept with one energy development per section and a cap on surface disturbance (although an area twice as large as the one under Alternative B) would limit unreclaimed surface disturbance inside and outside the ACEC.

Alternative D VRM is very similar to Alternative B, and would result in many more beneficial impacts to ACEC values than Alternative A or Alternative C. Under Alternative D, the change in the characteristic landscape would be minimal and would not attract the attention of the casual observer. This management would limit obtrusive development that would adversely impact the ACEC setting and view.

4.7.5.3.14.6.3. Resource Uses

Alternative D locatable, leasable, and minerals material disposals management would result in adverse impacts to ACEC values very similar to alternatives A and C, and more adverse than Alternative B. Unlike Alternative B, Alternative D would not close the ACEC to all mineral activity. However, there is low potential for locatable or leasable minerals in the ACEC, so any impacts would be low. Moreover, the relevant and important benefits of the area would be protected by other mineral management including the Beaver Rim MLP and the Heritage Tourism and Recreation Corridor as well as limits on surface disturbance in greater sage-grouse Core Area. Alternative D would result in the same important beneficial impacts to ACEC values as Alternative B by closing the area to mineral material disposals except in existing mineral disposal sites. Materials disposal would be the primary threat to ACEC values because the granite in the ACEC is desirable for AML projects and road building, and additional disposals would adversely impact the granite in the ACEC and the viewsheds. Similar to Alternative B, Alternative D would guard against this threat.

ROW management would result in similar beneficial impacts to values of concern as Alternative B and fewer adverse impacts than alternatives A and C because Alternative D would constrain visually intrusive ROWs. Alternative D's livestock grazing management could result in similar adverse impacts to vegetation as Alternative C by increasing surface disturbance with the potential for INNS spread. Vegetation treatments would have a small to moderate adverse impact on the viewshed but less so than Alternative A.

Alternative D recreation management would be similar to Alternative B except that the undeveloped SRMA is smaller. This would beneficially impact ACEC values because no development or structures are likely to be proposed that would adversely impact the ACEC. There would be little difference in impacts from recreation management among the alternatives. Similar to alternatives A and C, Alternative D would limit travel to existing roads and trails. This would result in fewer beneficial impacts to ACEC values than Alternative B, but only in the long term.

4.7.5.3.14.6.4. Special Designations

Alternative D management of other special designations would result in fewer beneficial impacts to ACEC values than Alternative B, but more than Alternative A or C. All of the Sweetwater Rocks ACEC would be in the management corridor around the NHTs. The limits on surface disturbance for the protection of trails would beneficially impact the ACEC and its viewshed. Coupled with the management of greater sage-grouse habitat, Alternative D management would result in beneficial impacts more similar to Alternative B than to Alternative A or Alternative C.

4.7.5.3.15. Detailed Analysis of Alternatives – Regional Historic Trails and Early Highways

Several historic wagon roads and stage trails played prominent roles in the settlement and development of South Pass, the Wind River Basin, and the Sweetwater Valley in the latter half of the 19th Century. These trails originated in the Rock Springs area (the Green River to South Pass to Fort Washakie Stage Trail and the Point of Rocks to South Pass Stage Trail), Rawlins (the Rawlins to Fort Washakie Stage Trail), and the Casper area (the Bridger Trail and the Casper to Lander Road Trail). Some of the early trails also led into the Bighorn Basin, and were instrumental in the settlement and development of that area (the Bridger Trail and the Birdseye Pass Stage Trail). A little later, early automobile roads that advertised the way to Yellowstone and other national parks became important arteries for development, commerce, and tourism (the Yellowstone Highway/National Park to Park Highway). All of these historic trails and early highways are eligible for listing on the NRHP and are considered worthy of protection. Their intact portions are often in good shape, and they often have historic settings that still evoke the appearance of the landscape in the late 1800s or early 1900s.

Adverse impacts to these types of resources typically result in a loss of integrity of the resource, or in some cases, in a loss of information. Adverse impacts to significant trails resources on

BLM-administered lands happen for several reasons, including actions that physically damage or destroy all or parts of a historic trail or highway; actions that alter a significant element of a trail; actions that introduce visual, atmospheric (air), or audible (noise) elements that can diminish the historical integrity of a trail or highway; or a lack of action, which can allow a trail resource to deteriorate. Increased access to areas also can adversely impact trails resources by increasing use, erosion, looting, and vandalism.

These regionally significant historic trails and early highways are all significant for their associations with important events in American history. In the planning area, these resources also are significant for their good to excellent historical settings, which help visitors imagine what it was like along these trails in the 1800s and the early 1900s. Adverse impacts to these values can result from the actions described above, and the impacts would be short-term and long-term because some of the impacts could be reversed but others cannot.

In some cases, historic trail and highway resources also are significant for their scientific data potential, especially at associated historic sites along the trails and highways. Actions that cause physical damage, and sometimes neglect, can adversely impact these resources. Adverse impacts to these types of resources would be long-term because, once they are damaged or disturbed, the impacts cannot be reversed.

Beneficial impacts to trails and highways occur from special management measures that could enhance the quality of that resource. Stabilization of historic inscriptions along the Bridger Trail and erosion control measures along the trails are examples of actions that result in beneficial impacts. Most beneficial impacts would be long-term, but eventually, adverse natural and/or human influences would require more measures to keep these resources from degrading.

4.7.5.3.15.1. Summary of Impacts

Impacts to RHT&EHs would vary by alternative in the following ways: alternatives A and C are similar in their protections, but Alternative A generally provides more protection than Alternative C. Alternatives A and C focus on protecting the immediate area around the RHT&EHs, but do not address impacts to visual resources farther from the trails. Alternatives B and D would provide much better protection for these resources and protect their historic settings to a moderate to high degree.

4.7.5.3.15.2. Impacts Common to All Alternatives

Standard procedures have been developed over the years to help address potential adverse impacts to regionally-significant historic trails and early highways. Standard management and protection procedures, guided by the NHPA, include avoidance, screening projects from the trails behind natural features, innovative redesign or camouflaging of projects, and using existing disturbances near trails for the placement of projects. These standard procedures have protected trails resources from adverse impacts in many cases. If these procedures have not been feasible, other measures (e.g., historical research, interpretive signage, special easements, and land purchases) have been used to offset impacts to the trails. All of the alternatives are guided by these standard procedures.

However, the standard procedures have not always adequately protected the historic settings of historic trails and highways. For example, large and visible projects some distance away have affected their intact historic settings. A modern gas plant a few miles from the Bridger Trail and a well pad near the Rawlins-Fort Washakie Stage Trail have resulted in adverse impacts to the historical setting of the trails and their historical integrity.

The standard procedures also do not apply to locatable mineral exploration projects of 5 acres or less, which do not require Plans of Operation. These operations do not require BLM approval, and could adversely impact historic trail and early highway resources if necessary for mining operations to proceed. Locatable minerals projects over 5 acres are subject to the 43 CFR 3809 regulations, which offer minimal protections to trails resources.

Another type of adverse impact on trails resources common to all alternatives would be from increased public use of lands, which can occur for several reasons. One reason would be improved access to formerly remote areas which is common in areas where development allows for the creation of new roads. Increased popularity and availability of OHVs, also allows access to formerly remote areas. A third reason would be increased public interest in specific historic sites or areas. As public use of lands increases, so can the adverse impacts to historic trail and early highway resources. As more use occurs, more trails are driven over. Some of these resources have been looted or vandalized. This impact would occur under any of the alternatives because access, OHV use, and public use and interest along the historic trails and early highways are all expected to increase.

A beneficial impact common to all alternatives would be the indirect protection provided by the greater sage-grouse Core Area management policy. Approximately 60 percent of the RHT&EHs and their surroundings are located within the Core Area. This would reduce impacts to their settings.

Fire management, including the use of heavy equipment, does not vary substantially by alternative when culturally sensitive resources are involved. Accordingly, the impacts from fire suppression activities would not vary by alternative.

4.7.5.3.15.3. Alternative A

4.7.5.3.15.3.1. Program Management

In the 1980s, the Wyoming BLM began applying stipulations to oil and gas leases that specified that development projects would be avoided within ¼ mile of a historic trail. This stipulation, together with NHPA regulations, provided some protection for historic trails and early highways from modern impacts. The protection and management procedures developed at that time, are still in use. Impacts to trails from this management are considered to be beneficial near the trails, while farther away from the trails, they are considered adverse because of the potential to introduce new intrusions into the historical setting.

4.7.5.3.15.3.2. Resources

Alternative A air quality management would result in a neutral or slightly adverse impact to RHT&EHs. Efforts to maintain air quality around the trails would help maintain their important qualities. However, if air quality degrades, it would adversely impact the trails.

VRM Class ratings that protect natural viewsheds would beneficially impact RHT&EHs by moderating modern development in an area. However, Alternative A manages most of the trails and highways as VRM Class IV, which would allow a wide range of visual intrusions. Therefore, Alternative A VRM would adversely impact these resources.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A would provide additional protections for historic trail and highway resources.

4.7.5.3.15.3.3. Resource Uses

Alternative A provides mostly minimal protection from locatable mineral exploration, except where there are withdrawals or ACECs. This alternative provides minimal protection from locatable mineral exploration under the standard of preventing unnecessary or undue degradation. No Plan of Operations is required for exploration projects unless they would disturb more than 5 acres, so historic trails and highways would be subject to less protection from mineral exploration impacts. Some of the trails are in areas of high potential for locatable minerals (the Rawlins-Fort Washakie Trail in uranium areas, and the Green River to South Pass to Fort Washakie and the Point of Rock to South Pass Trails in gold mining areas); some are in areas with low potential. Therefore, Alternative A impacts to historic trails and highways would be both adverse and neutral.

Alternative A would provide more protections from leasable fluid minerals, leasable solid minerals, and mineral materials disposals than for locatable minerals. Alternative A includes NSO restrictions within ¼ mile on either side of trails, and enforces close-type stipulations to protect trails resources. However, outside the ¼-mile on either side buffer, there are no protections for historic trails and highways specific to development which could adversely impact the historic settings of trails. At present, these impacts are managed on a case-by-case basis, and current protection measures usually focus on reducing impacts rather than preventing them. The most likely impact to the trails and early highways would be from oil and gas development in the middle and northern Wind River Basin, which would impact the Bridger Trail, the Yellowstone/National Park to Park Highway Trail, the Casper to Lander Road, and the Rawlins to Fort Washakie Stage Trail. Current management protects the immediate foreground of the RHT&EHs, but is limited in protecting the historic settings of the trails outside of this area. Therefore, impacts under Alternative A would be both beneficial and adverse.

Highly visible ROW and other development projects, such as wind-energy developments, mines, gas plants, power plants, and large transmission lines, would adversely impact historic trails and highways in substantial ways. For example, a wind-energy development or gas plant near a trail with good historical settings would introduce a modern contrast that would adversely impact the trail's value as a historic resource. Alternative A includes no protections from these types of projects other than standard NHPA measures.

Adverse impacts to RHT&EHs under Alternative A from range development projects would be similar to other developments. However, because of their lower profile, they often have a lower contrast with the historic settings. Avoidance-type stipulations for range developments within ¼ mile either side of trails are enforced to protect trails resources. However, outside the ¼-mile buffer, there are no protections specific to development for the trails, and their historic settings would be subject to adverse impacts. At present, these impacts are managed on a case-by-case basis, and current protection measures usually focus on reducing impacts rather than preventing them. The most likely adverse impact to historic trails would be from fencing projects that cross them. Such fences are periodically proposed. Therefore, the impacts under Alternative A would be both beneficial and adverse.

4.7.5.3.15.3.4. Special Designations

Under Alternative A, RHT&EHs would not be covered by any special designations and would not be protected unless they traverse a specially designated area.

4.7.5.3.15.4. Alternative B

4.7.5.3.15.4.1. Program Management

Alternative B would provide for a somewhat higher level of proactive management than Alternative A. Actively pursuing opportunities to reduce modern visual intrusions along the regional trails and highways would be a beneficial impact.

4.7.5.3.15.4.2. Resources

Alternative B would specify that air quality management reduce emissions and improve air quality. This action would have a beneficial impact on the historic trails and highways, and would make Alternative B more beneficial to the RHT&EHs than Alternative A.

Wildlife management under Alternative B is much more protective than under Alternative A and would prohibit surface disturbance in many more areas than under Alternative A. This would result in greater beneficial impacts to ACEC values than under Alternative A. By limiting fences and roads in crucial big game winter range and prohibiting surface disturbance within 0.6 miles of sage-grouse leks, Alternative B would reduce the amount of surface disturbance which would beneficially impact the RHT&EHs by limiting modern intrusions into the historic settings. In addition, the Alternative B Government Draw/Upper Sweetwater Sage-Grouse ACEC (see below) would result in additional beneficial impacts to RHT&EHs.

Alternative B classifies more lands as VRM Class I or II than Alternative A, and this would help protect some of the RHT&EHs from potential disturbances caused by developments. While VRM for the trails and highways in the northern half of the planning area is not substantially different than under Alternative A, the trails in the southern half of the planning area are in a VRM Class II area under Alternative B, which would provide substantially better protection for these resources than Alternative A.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) would be greatest under Alternative B, providing additional protection for RHT&EHs and reducing adverse impacts.

4.7.5.3.15.4.3. Resource Uses

Alternative B would propose to withdraw lands for ½ mile on each side of RHT&EHs from locatable minerals entry. This would better protect RHT&EHs than Alternative A. This ½-mile withdrawal means more of the historical setting of the trails and highways would be protected from the impacts of locatable minerals development. This would be a substantial benefit for trails in the South Pass and south of Green Mountain areas, where mining impacts would be most likely along the trails.

Leasable fluid minerals management under Alternative B closes 1,851,349 more acres than Alternative A which would help protect some of the trail and highway resources from potential disturbances. While fluid minerals management for the trails and highways in the northern half of the planning area would not change substantially, the trails in the southern half of the planning area (the Rawlins to Fort Washakie, Green River to South Pass to Fort Washakie, and Point of Rocks to South Pass Stage Trails) are in a closed area, which would provide much better protection for these resources than Alternative A.

Alternative B would close or place major constraints on solid mineral exploration and development, and mineral materials disposals on most of the lands in the planning area. This would protect RHT&EHs from potential disturbances. Most of the trails and almost all of their historical settings are closed to development, so Alternative B would provide much better protection than Alternative A. No impacts are expected from solid minerals activities and mineral materials disposals under Alternative B.

Alternative B would restrict wind-energy developments, power and gas plants, and large ROWs to a much greater extent than Alternative A. Alternative B protects most of RHT&EHs, which would more beneficially impact those resources than management under Alternative A.

Alternative B avoids visible range development projects on more land than does Alternative A and this management would protect RHT&EHs from potential disturbances. The trails are closed to visible range developments for a distance of 2 miles on either side, therefore, Alternative B would provide much better protection than Alternative A and no impacts would be expected. This mostly affects fencing projects that would cross the trails, which are periodically proposed.

4.7.5.3.15.4.4. Special Designations

Under Alternative B, the RHT&EHs ACEC would extend to ½ mile on each side of the trails. This would enhance the protection of trails and highways by reducing the potential for adverse impacts to their intact historical settings. This alternative would provide more protection for the trails over Alternative A. The regional trails in the southern part of the planning area overlap with the Government Draw/Upper Sweetwater Sage-Grouse ACEC and some with the Congressional Trails and South Pass Historic Mining Area ACECs, so the setting for these trails is further protected by the limits on surface disturbance from the other ACECs.

4.7.5.3.15.5. Alternative C

4.7.5.3.15.5.1. Program Management

Alternative C would maintain proactive management of the regional trails to a similar level as Alternative A. Both alternatives are designed to remove modern intrusions along the trails and highways on a case-by-case basis. Alternative C would not designate any ACECs.

4.7.5.3.15.5.2. Resources

Alternative C would have the same impact on air quality as Alternative A, and the same neutral to slightly adverse impacts to the RHT&EHs. Alternative C has the same or slightly less soil and riparian-wetland protections as Alternative A, and would result in the same limited beneficial impacts to trails by limiting surface disturbance.

Because Alternative C would place a greater emphasis on resource use and include fewer restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations). This alternative would result in more adverse impacts to RHT&EHs than alternatives A and B. Alternative C manages habitat for greater sage-grouse in the same way as Alternative A and would result in the same limited beneficial impacts to the trails' historic setting. Alternative C would result in a much less beneficial impact than management under Alternative B.

Alternative C includes 179,138 fewer acres of VRM Class I and II than Alternative A, which would result in less protection for RHT&EHs. Almost all of the historic trails and highways are in VRM Class III or IV, so Alternative C would allow more modern developments around the trails, and would cause more adverse impacts than Alternative A and substantially more than Alternative B.

4.7.5.3.15.5.3. Resource Uses

Alternative C would provide no protection for RHT&EHs from locatable mineral exploration, applying only minimal protection from locatable mineral exploration via standard prevention of undue or unnecessary degradation requirements. A Plan of Operations would not be required unless the mining project covers more than 5 acres of disturbance. Impacts would be most likely to occur in areas of high potential for mining activity, such as trails in the South Pass gold mining and south of Green Mountain uranium areas. Alternative C would provide the same level of protection for RHT&EHs as Alternative A, and less than Alternative B.

Under Alternative C, adverse impacts to the regionally-significant historic trails and highways from leasable fluid/solid minerals and mineral materials would be similar to impacts from locatable minerals. Very few areas are closed to these uses, so almost all of the RHT&EHs would be subject to impacts. Impacts would be managed on a case-by-case basis and protection measures would focus on reducing impacts rather than preventing them. Therefore, Alternative C would provide less protection for RHT&EHs than Alternative A. The most likely areas to experience adverse impact from oil and gas development would be the middle and northern Wind River Basin.

Alternative C manages wind-energy development, mines, and large ROWs in the same manner as Alternative A and the same limited beneficial impacts to trails would occur.

Adverse impacts to the RHT&EHs from range development projects would be similar under Alternative C as under Alternative A.

4.7.5.3.15.5.4. Special Designations

Under Alternative C, there would be no special designations except the Congressionally Designated Trails. Under this alternative, the historic trails and highways would be open to adverse impacts along most of their lengths since any protections provided by ACEC designation would not occur. Therefore, Alternative C would have more adverse impacts than Alternative A.

4.7.5.3.15.6. Alternative D

4.7.5.3.15.6.1. Program Management

Alternative D would maintain proactive management to the same level as alternatives A and C. These alternatives were designed to remove modern intrusions along the trails and highways on a case-by-case basis. This would be less beneficial management than Alternative B, which establishes intact portions of the trails as an ACEC comprised of the areas extending out ¼ mile on either side of the regional historic trails. Alternative B would provide much better protection for the regional historic trails than Alternative D.

4.7.5.3.15.6.2. Resources

Alternative D air quality management is the same as alternatives A and C, and would result in the same impacts to regional trails and highways. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) would be greatest under alternatives B and D, providing additional protections for regional trails and reducing adverse impacts to the extent that those protections limit surface disturbance within the settings of the trails.

Alternative D management of habitat for greater sage-grouse would be somewhat less restrictive of surface disturbance than Alternative B. Nevertheless, Alternative D would limit development within 0.6 mile of leks, limit the number of disturbances per section, and cap surface disturbance in the Core Area. This management should reduce the intrusion of modern development in the historic setting of the trails, which would be a long-term beneficial impact. The Core Area approach would result in beneficial impacts to the Casper to Lander Road which would not be protected by any special designation but are located within the greater sage-grouse Core Area.

Alternative D would classify much more land around trails and highways as VRM Class II than Alternative A or C, and slightly more than Alternative B. However, this alternative classifies more land as VRM Class III compared to Alternative B. The overall beneficial impact of Alternative D management would be to protect lands closer to the site better than the other three alternatives, but to afford less protection than Alternative B for lands farther away. Alternative D would protect most sensitive lands from the introduction of developments that would be out of character with the area’s historical and natural settings.

4.7.5.3.15.6.3. Resource Uses

Alternative D would provide little or no protection for RHT&EHs from locatable mineral exploration. Similar to alternatives A and C, Alternative D would provide minimal protection from locatable mineral exploration under the standard of preventing undue or unnecessary degradation. No Plan of Operations is required for exploration projects unless they would disturb more than 5 acres, so historic trails and early highways would be subject to less protection from exploration impacts. This management could adversely impact historical trails, especially in areas of high potential for mining activity, such as trails in the South Pass gold mining and south of Green Mountain uranium areas. Therefore, Alternative D would provide for a similar level of protection for historic trails and highways as alternatives A and C, and less than Alternative B.

For leasable fluid and solid minerals, mineral materials disposals, and ROWs, Alternative D breaks management of the RHT&EHs into two categories: within DDAs and outside DDAs. Within DDAs, resource uses would be open while outside DDAs, resource uses would be subject to protection of historic settings up to 2 miles through the use of BMPs. Alternative C would not protect trails, Alternative A would protect them to a lesser extent than Alternative D (up to ¼ mile either side), and Alternative B would protect them up to 5 miles on either side. Therefore, Alternative D would protect RHT&EH resources better than alternatives A and C, but not as well as Alternative B.

4.7.5.3.15.6.4. Special Designations

No portions of the RHT&EHs would be managed as a special designation under this alternative. This would result in fewer beneficial impacts than the Alternative B ACEC designation, which enhances the protection of the site and its surroundings by reducing the potential for adverse impacts to its intact natural settings. However, Alternative D would beneficially impact segments of the regional trails through limits on surface disturbance and VRM designed to benefit other programs, including the corridor buffering the Heritage and Recreation Area surrounding the Congressionally Designated Trails, the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area, and the South Pass Historic Landscape ACEC. Management in these areas would help protect the historic settings of regional trails.

4.7.5.3.16. Detailed Analysis of Alternatives – Government Draw/Upper Sweetwater Sage-Grouse

4.7.5.3.16.1. Summary of Impacts

Alternatives A and C would have similar adverse impacts in that neither designates the area as an ACEC and manages with standard stipulations. Both have more limited greater sage-grouse protections from surface disturbance and thus would have a greater potential to adversely impact more acres of greater sage-grouse habitat. Alternatives B and D would have far fewer adverse impacts because surface disturbance would be more limited under both alternatives, although more so in Alternative B than Alternative D.

Alternative B would have the most beneficial impacts because it designates 1,246,791 acres as an ACEC with management prescriptions to protect sage-grouse habitat. Alternative B greater sage-grouse management would reduce the amount and intensity of energy development to a greater extent than Alternative D, but that is likely to have more than a very low difference in beneficial impacts than Alternative D because of the low potential for oil and gas development. Alternative D would not designate the area as an ACEC and therefore, would not require a Plan of Operations for exploration activities smaller than 5 acres. There could be adverse impacts to greater sage-grouse from locatable mineral exploration, primarily bentonite.

4.7.5.3.16.2. Background Information

Before the Wyoming Governor’s Sage-grouse Core Area was established, the Local Working Group identified an area in Government Draw and the Upper Sweetwater River as an important area for greater sage-grouse and recommended that the BLM implement special management for the area because of its very high concentration of sage-grouse leks and associated habitats. Data for this population provides information regarding its year-round movement and this information was used to establish the boundaries of the Local Working Group's proposed ACEC. This area contains 306,360 acres.

Subsequently, the WGFD proposed a much larger geographic area for management as an ACEC because this area also had high concentrations of greater sage-grouse in locations that had not been leased for oil and gas development. There is no site-specific data for the year-round movement of greater sage-grouse populations for all of this expanded area. The BLM agreed that greater sage-grouse values in the larger area met the relevance and importance criteria and that designation of the ACEC should be analyzed. Afterward, the WGFD stated that the position of the State of Wyoming is that Core Area management adequately protects greater sage-grouse values and that ACEC designation is not needed.

BLM determined that the area originally did meet the relevance and importance criteria for ACEC designation because of the concentrated, unfragmented nature of the habitat in the area. Accordingly, all alternatives analyze the impacts of the management decision for the 1,246,791 acres expanded area for the ACEC. Under alternatives A and C, which do not designate any portion of the expanded area as an ACEC for the benefit of greater sage-grouse, the impacts from the management of the expanded area is fully analyzed in the *Special Status Species – Wildlife* section. Rather than repeat this analysis, reference is made in each of these sections to the *Special Status Species – Wildlife* section with a general statement of the impacts. Alternatives B and D analyze the site-specific management within both the expanded area and the area the Local Working Group originally proposed as an ACEC. Reference to the *Special Status Species – Wildlife* section is still made but site-specific analysis is offered as appropriate.

4.7.5.3.16.3. Impacts Common to All Alternatives

The BLM manages greater sage-grouse as a sensitive species under all alternatives. The prescriptions associated with this approach would vary by alternative with resulting variation in the impacts to values of concern.

Management actions that protect physical and biological resources through less surface disturbance or other management restrictions result in beneficial impacts to greater sage-grouse. All alternatives use an IPM approach, which would result in the same impacts to sage-grouse in all alternatives. All INNS treatments require site-specific analysis to determine impacts to greater sage-grouse and other values.

Prescribed and wildland fire can adversely impact greater sage-grouse. Since greater sage-grouse are a BLM sensitive species, it is likely that prescribed fire would be avoided in greater sage-grouse habitat. Therefore, while the alternatives vary in the acres of vegetation treatment that would likely occur, the management of wildland fire and the use of prescribed fire would be likely to be the same under all alternatives in areas identified by the Wyoming Governor's Executive Order.

Forest management would not result in impacts to greater sage-grouse because forests are generally not suitable habitat for the species.

Visual resources are not part of the ACEC relevant and important features, but VRM can result in beneficial impacts to habitat by limiting surface disturbance and precluding vertical structures that could serve as raptor perches and increase greater sage-grouse predation. Management under all alternatives would be consistent with general VRM for the area and would not be specially managed as an ACEC prescription as is the case in Red Canyon and other ACECs for which visual resources meet relevance and importance criteria. Generally, the lower the VRM Class (III or IV) for the area, the greater the likelihood of adverse impacts to greater sage-grouse through surface disturbance.

All mineral development and other surface-disturbing or disruptive activities such as ROWs and road development would result in adverse impacts to greater sage-grouse, both from habitat loss and habitat fragmentation as well as the introduction of structures that would offer a predator perch and a collision hazard. While more surface disturbance results in more adverse impacts, impacts are thought to be the most important if they occur near a lek or in nesting habitat. See the *Special Status Species – Wildlife* section for more information.

4.7.5.3.16.4. Alternative A

4.7.5.3.16.4.1. Program Management

Alternative A would not designate any portion of either the Local Working Group area or the expanded area as the Government Draw/Upper Sweetwater Sage-Grouse ACEC (although portions of the expanded area would be designated for other values such as NHTs). Alternative A would manage the Local Working Group area and the expanded area for a variety of uses. To the extent that this management would benefit wildlife and sagebrush habitat, it would beneficially impact greater sage-grouse. The *Special Status Species – Wildlife* section provides more details about the impacts to greater sage-grouse from Alternative A and this section does not repeat the information. Generally, Alternative A would utilize management prescriptions for greater sage-grouse that are less protective than current research indicates and would be the same as those that have contributed to the downward trend in greater sage-grouse numbers.

4.7.5.3.16.4.2. Resources

Alternative A management in the expanded area is consistent with management described in the *Special Status Species – Wildlife* section and impacts would be the same.

4.7.5.3.16.4.3. Resource Uses

Impacts (generally adverse) to the greater sage-grouse values in the expanded area are the same as those described in the *Special Status Species – Wildlife* section.

Much of the expanded area contains high-value wind-energy potential. While Alternative A places some management limitations on the development of industrial wind energy, it is likely that wind energy would be developed in large reaches of the area, which would result in severe adverse impacts to greater sage-grouse from loss of habitat unless precluded by the State of Wyoming through the Industrial Siting Board. Wind-energy development and ROWs require substantial surface disturbance, and the high profile nature of the turbines, including movement and noise, would likely be very disruptive to greater sage-grouse and cause the birds to avoid the development area. The presence of nearby high profile structures can adversely impact male attendance and breeding success at leks. Industrial wind-energy development would likely result in irretrievable adverse impacts to greater sage-grouse, a fact the USFWS recognized in its recent determination that wind-energy development – including site testing – is incompatible with greater sage-grouse in the Core Area (USFWS 2010). Adverse impacts from ROW management under Alternative A could be moderated by the Wyoming Industrial Siting Board-imposed limits on industrial wind-energy development in the Core Area, but not all development requires the Board's approval.

4.7.5.3.16.4.4. Special Designations

Management under Alternative A would result in the same impacts to the expanded ACEC area described in the *Special Status Species – Wildlife* section under *Special Designations*. There would be beneficial impacts to Government Draw/Upper Sweetwater Sage-Grouse ACEC values where other special designations, such as the NHT ACEC, limit surface-disturbing and disruptive activities.

4.7.5.3.16.5. Alternative B

4.7.5.3.16.5.1. Program Management

Alternative B would designate the expanded area (1,246,791 acres) as an ACEC. In addition, Alternative B management generally protects resources, even at the expense of resource uses. The impacts to greater sage-grouse from management of resources and resource uses are generally described in the *Special Status Species – Wildlife* section.

4.7.5.3.16.5.2. Resources

Alternative B manages the ACEC to have fuels reduction treatments performed at appropriate times of the year so as to improve the grass and forb understory on which greater sage-grouse rely while minimizing long-term impacts to the sagebrush community. The additional acres likely to be treated under Alternative B would result in a more beneficial impact to greater sage-grouse habitat than the reduced acres in Alternative A.

Visual resources are more protected under Alternative B than Alternative A because Alternative B manages all of the ACEC (the expanded area) as VRM Class II, which would limit new development and other surface-disturbing activities that would adversely impact greater sage-grouse habitat. Because VRM under Alternative A allows much more surface disturbance, Alternative B would result in a substantial benefit to greater sage-grouse. However, this benefit cannot be quantified in the absence of a site-specific analysis.

4.7.5.3.16.5.3. Resource Uses

Alternative B locatable, leasable, and mineral materials management would be much more protective of ACEC values than Alternative A since Alternative B would pursue withdrawal from locatable mineral entry and closes the area to mineral leasing. See the *Special Status Species – Wildlife* section for an analysis of how these uses would adversely impact greater sage-grouse habitat. The ACEC has high potential for uranium and bentonite and some potential for gold. Exploration and development of these locatable minerals include intensive development that would result in the long-term loss, if not the permanent loss, of greater sage-grouse habitat. While areas having high bentonite potential generally do not support suitable greater sage-grouse habitat, strip mining of bentonite would fragment habitat that is suitable, particularly in the area where four-season habitat has been identified. The ACEC has moderate potential for leasable minerals, including oil and gas and phosphate. Alternative B closes the ACEC to mineral leasing, which would result in a greater beneficial impact to greater sage-grouse than Alternative A, which opens the ACEC subject to standard stipulations.

Alternative B management of wind-energy development and major ROWs and corridors would be substantially more beneficial to ACEC values than Alternative A because Alternative B closes the area to such actions. Approximately 210,495 acres of the ACEC have high potential for wind-energy development.

Alternative B livestock grazing management would result in fewer adverse impacts to ACEC values than Alternative A management. This difference is analyzed in the *Special Status Species – Wildlife* section. Over the twenty year life of the plan, the difference in acres treated to improve habitat would result in more beneficial impacts than emphasizing infrastructure development.

Alternative B travel management would be more beneficial to ACEC values than Alternative A because Alternative B limits travel in the expanded area to designated roads and trails. Alternative B also limits mechanized travel to designated roads and trails, which would limit adverse impacts from wildlife encounters with humans in new roadless areas.

4.7.5.3.16.5.4. Special Designations

The ACEC for the benefit of greater sage-grouse contains within it several ACECs or portions of ACECs including NHT ACEC, South Pass Historic Mining Area ACEC, Lander Slope, Red Canyon, Beaver Rim, and Green Mountain. The impacts of these underlying ACECs would be similar to the management in the expanded area ACEC management. These ACEC designations would beneficially impact greater sage-grouse to the extent that surface disturbance in or near habitat is limited. These limits on surface disturbance would be applied in the expanded Green Mountain ACEC, the northern most extension of the Beaver Rim ACEC, the eastern portion of the Congressional Trails ACEC and the expanded South Pass Historic Mining Area ACEC. Other than designation as an ACEC, Alternative B does not include special designation management that would impact ACEC values.

4.7.5.3.16.6. Alternative C

4.7.5.3.16.6.1. Program Management

Alternative C would not designate any portion of the Local Working Group area or the expanded area as an ACEC. The Alternative C emphasis on resource uses over physical and biological resources would result in more adverse impacts to ACEC values. Alternative C management in the expanded area is consistent with management described in the *Special Status Species – Wildlife* section, and impacts would be the same. As with Alternative A, Alternative C would likely result in the continued downward trend of greater sage-grouse.

4.7.5.3.16.6.2. Resources

As with Alternative A, impacts to greater sage-grouse by resource management actions are described in the *Special Status Species – Wildlife* section. Alternative C management would have generally the same impacts as under Alternative A except to a greater extent because more surface disturbance would be authorized. Alternative C would have the same amount of vegetation treatment as Alternative A with the same limited beneficial impacts to greater sage-grouse in comparison to Alternative B. Alternative C VRM would be more likely to adversely impact ACEC values than under Alternative B because more surface disturbance and vertical construction, such as fences and power poles (with resulting adverse impacts to ACEC values) would be allowed under Alternative C than under Alternative B.

4.7.5.3.16.6.3. Resource Uses

Adverse impacts to greater sage-grouse from resource uses are analyzed in the *Special Status Species – Wildlife* section. These impacts would generally somewhat more adverse under Alternative C than Alternative A, and far more adverse than under Alternative B, primarily because of special designation management and limits on surface disturbance under Alternative B. The ACEC has locatable minerals (uranium, bentonite, and some gold), leasable phosphate and extensive mineral materials.

Alternative C management of major ROWs, including wind-energy development, transmission lines would result in substantially more adverse impacts to greater sage-grouse resource that Alternative B. Except for the special designation management identified below, the impacts of major ROWs would be similar to Alternative A but somewhat greater because uses are anticipated to be higher.

Alternative C would allow major ROWs in the expanded area. There is demand in the area for ROWs due to existing and anticipated mineral activities, and industrial wind-energy development and associated transmission lines (also high-profile structures). With no barriers to north south transmission lines (see below under Special Designations), high potential areas such as in the Rattlesnake Mountains and Gas Hills, would be far more likely to be developed, with transmission lines running south through the expanded area. The potential adverse impact to greater sage-grouse would be limited by State of Wyoming Industrial Siting Board rules, but those rules are not applied to non-Core Area.

Livestock grazing management under Alternative C would result in more adverse impacts than Alternative B and similar adverse impacts as Alternative A, except to a greater degree as impacts from more intensive grazing and less controlled range improvement projects would be greater. See the *Special Status Species – Wildlife* section. Increased infrastructure concentrates livestock, adversely impacting vegetation, and fences can fragment habitat and migration corridors. Fences result in adverse impacts to greater sage-grouse because they are both a hazard to flight and a potential perch for predators.

The impacts of travel management under Alternative C would be the same as under Alternative A and less beneficial than under Alternative B.

4.7.5.3.16.6.4. Special Designations

There would be no special designation management of the ACEC under Alternative C and adverse impacts to greater sage-grouse would occur in the expanded area. The degree of adverse impact would depend on what activities would be authorized by the State of Wyoming in issuing mine permits for locatable mineral activities in the Core Area and the approval of the Wyoming DEQ Industrial Siting Board in the Core Area. With only minor exceptions, all of the expanded area is located within the Core Area. ROWs, including transmission lines, would be authorized and not excluded as under Alternative B or avoided in certain areas as under Alternative A where other ACECs underlying the expanded would limit ROWs. See Alternative B's identification of these other protections.

4.7.5.3.16.7. Alternative D

4.7.5.3.16.7.1. Program Management

Alternative D would manage 306,360 acres as the Government Draw/Upper Sweetwater Sage-Grouse Reference and Education Area. Within the area, Alternative D would designate 36,302 acres as the Twin Creek ACEC. The Reference and Education Area would be the same area as the Local Working Group proposed as an ACEC. Management across the entire Reference and Education Area would be the same: NSO for oil and gas leasing; closed to solid mineral leasing, mineral materials disposals, and geophysical explorations; an exclusion area for major ROWs, except for in designated corridors; and an avoidance area for minor ROWs. Additionally, Alternative D would require a Plan of Operations in the Twin Creek ACEC, an area of high to moderate potential for bentonite.

The impact of Alternative D general (resource and resource use) management to greater sage-grouse is analyzed in detail in the *Special Status Species – Wildlife* section. The remainder of this analysis focuses on impacts to the Reference and Education Area. The Twin Creek ACEC is analyzed below under Special Designations.

4.7.5.3.16.7.2. Resources

Alternative D would manage physical and biological resources in the Reference and Education Area more similar to Alternative A than Alternative B. Therefore, beneficial impacts to ACEC values would be more like impacts under Alternative A. Alternative D general wildlife management includes more protections for greater sage-grouse and would result in more beneficial impacts to greater sage-grouse than alternatives A and C, although somewhat less than Alternative B (see the *Special Status Species – Wildlife* section). Alternative D would result in fewer beneficial impacts to greater sage-grouse than Alternative B because Alternative D allows more surface disturbance. However, Alternative D lek protections and seasonal nesting protections would result in the same beneficial impacts as Alternative B.

Although no additional roads are contemplated under any alternative, Alternative D management of the Reference and Education Area would result in beneficial impacts to Reference and Education Area values similar to Alternative B because Alternative D allows much less surface disturbance than alternatives A and C. Part of the beneficial impacts of reduced surface disturbance would arise from protection of the vegetation (which can take decades to reclaim to predisturbance condition) as well as from the reduced likelihood of INNS spread that accompanies surface disturbance.

Alternative D VRM would include some lands in the Reference and Education Area managed as VRM III; therefore, more surface-disturbing and disruptive activities could be authorized than under Alternative B. However, beneficial impacts to greater sage-grouse values in the Reference and Education Area would likely be the same under these two alternatives because of the Reference and Education Area minerals and realty management discussed below.

4.7.5.3.16.7.3. Resource Uses

Locatable and leasable minerals management under Alternative D would result in more adverse impacts to ACEC values than Alternative B, but less than alternatives A and C. Alternative D applies an NSO restriction to oil and gas, which would result in similar beneficial impacts to greater sage-grouse as Alternative B, but would be applied to less acres. Because there is some moderate to low potential for oil and gas in the Reference and Education Area, management under Alternative D would result in fewer adverse impacts than Alternative A or C. Alternative D also closes the Reference and Education Area to solid mineral leasing, geophysical exploration, and mineral materials disposals. This management would beneficially impact greater sage-grouse, particularly in the portions of the Reference and Education Area that have phosphate potential. This management is the same as Alternative B, and would result in far more beneficial impacts than Alternative A or Alternative C.

Alternative D does not withdraw the Reference and Education Area from locatable mineral activities and therefore would result in more adverse impacts than Alternative B. However, the Plan of Operations requirement in the Twin Creek ACEC would provide the BLM with a tool to help avoid adverse impacts in an area with high to moderate bentonite potential. A portion of the ACEC (Johnny Behind the Rocks) is withdrawn for recreation use, which would result in further beneficial impacts to greater sage-grouse that utilize the area.

In the portion of the expanded area designated as an ACEC under Alternative B that is outside the Reference and Education Area, impacts to greater sage-grouse would depend on standard greater sage-grouse management under Alternative D. Ninety-nine percent of the lands in the Alternative B expanded area that are outside the Reference and Education Area are located within the Core Area. Although Core Area management would result in somewhat fewer beneficial impacts to greater sage-grouse than under Alternative B, it would be much more beneficial than management under alternatives A and C. However, potential adverse impacts to greater sage-grouse in areas with high to moderate potential for uranium development would be the same under Alternative D as under alternatives A and C, because Alternative D does not restrict uranium development or subject uranium development to caps on surface disturbance as it does for oil and gas and wind-energy development.

Alternative D restricts major ROWs and corridors, including wind-energy development, transmission lines, and minor ROWs in the Reference and Education Area, which would result in beneficial impacts to greater sage-grouse resources similar to those under Alternative B. Outside the Reference and Education Area, Alternative D management for the protection of Congressionally Designated Trails would result in substantial beneficial impacts to greater sage-grouse by limiting surface disturbance. Although Alternative D would result in somewhat more adverse impacts to greater sage-grouse than Alternative B, it would result in greater beneficial impacts than Alternative A or Alternative C.

Impacts from livestock grazing management under Alternative D in both the Twin Creek area and the expanded area are described in the *Special Status Species – Wildlife* section. Generally, these would be beneficial in comparison to alternatives A and C but less beneficial than Alternative B. While range improvement projects would involve less infrastructure within the Reference and Education Area, projects would likely be undertaken in the rest of the expanded area, pursuant to a grazing management strategy, with adverse impacts to greater sage-grouse. Increased infrastructure concentrates livestock, adversely impacts vegetation, and fragments habitat and migration corridors. Fences can be a considerable adverse impact to greater sage-grouse because they are both a hazard to flight and a potential perch for predators.

Alternative D travel management would result in impacts the same as alternatives A and C, and less beneficial than Alternative B.

4.7.5.3.16.7.4. Special Designations

The Reference and Education Area includes special management that would beneficially impact greater sage-grouse values. The Reference and Education Area's southern boundary is the Sweetwater River, so it includes a portion of the Sweetwater WSA (which is common to all alternatives) and the ¼-mile buffer for the portion of the Sweetwater River through the Sweetwater Canyon managed as suitable for inclusion in the NWSRS. In addition, the Reference and Education Area includes part of the South Pass Historical Landscape ACEC and all of the Beaver Rim ACEC. ACEC management prescriptions are compatible with those of the Reference and Education Area, and would beneficially impact sage-grouse values. In the two ACECs, Plans of Operation area required for locatable mineral entry, which would help avoid adverse impacts to greater sage-grouse from exploration activities. Plans of Operation would likely not prevent adverse impacts during mining operations in the Reference and Education Area.

4.8. Socioeconomic Resources

4.8.1. Social Conditions

This section addresses the potential for the alternatives to impact social conditions in the planning area, including direct, indirect, short-term, and long-term impacts. Appendix A (p. 1343) identifies laws, regulations, policies, and guidance considered in the analysis of social conditions.

Potential impacts to social conditions include changes in population, such as fluctuations caused by economic boom-and-bust cycles; changes in the demand for housing and community services, along with community fiscal conditions, which can impact the ability of state, regional, and local governments to supply community services such as education; and changes in community character, culture, and social trends. The BLM does not directly manage social conditions in the planning area. However, BLM management actions have the potential to indirectly impact social conditions. For example, a decision to prohibit future oil and gas exploration or leasing on BLM-administered mineral estate could adversely impact job opportunities in the planning area, which may lead to reductions in populations in parts of the planning area as residents move away to find job opportunities elsewhere (or as fewer people move to the planning area for jobs).

4.8.1.1. Summary of Impacts

Under Alternative B, activities on BLM-administered land and mineral estate related to oil and gas, livestock grazing, and recreation would support an average of 2,621 full-time and part-time jobs per year, which represents approximately 2.1 percent of total employment in the planning area as of 2007 (Table 4.49, “Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area” (p. 1185)). Compared to Alternative A, which essentially represents the continuation of current trends, this represents a decrease of 1,000 jobs (approximate 28 percent decrease), or approximately 0.8 percent of employment using 2007 employment statistics. These job losses would relate to restrictions on development of oil and gas resources and restrictions on grazing. Alternative B would result in more jobs related to recreation. It is possible that more oil and gas wells would be drilled on nearby state or private land, partially compensating for the projected employment decrease.

Table 4.46, "Overall Impacts to Social Conditions by Alternative" (p. 1169) summarizes impacts to social conditions as discussed in this section for alternatives B, C, and D compared to Alternative A. Although the table endeavors to summarize impacts and characterize them as low, medium, or high, it does not classify the impacts as beneficial or adverse. Some interest groups could view social impacts as beneficial; some interest groups could view impacts as adverse. For example, increased emphasis on resource conservation under Alternative B would result in a change from the current balance of uses, which wilderness advocates would likely view as a beneficial impact, but oil and gas development interests would view as adverse. In Table 4.46, "Overall Impacts to Social Conditions by Alternative" (p. 1169), high impacts are those that would result in substantial changes to an existing condition in a way that affects a large number of people and/or endures for a long period. Low impacts are those a limited number of people would experience for a limited time. Medium impacts are intermediate and would fall between high and low.

Table 4.46. Overall Impacts to Social Conditions by Alternative

Impact	Alternative A	Alternative B	Alternative C	Alternative D
Impact on Population	Low Impact	Medium Impact (potential reductions focused in oil/gas service areas, which generally correspond to population centers)	Low Impact	Low Impact
Impact on Housing and Community Services	Low Impact	Medium Impact (due to potential population reductions)	Low Impact	Low Impact
Impacts on Quality of Life and Local Culture	Low Impact	Low Impact (change from recent trends will constitute greater emphasis on resource conservation)	Low Impact (change from recent trends will constitute greater emphasis on resource development)	Low Impact (emphasis on balanced use continues)

Source: Based on the analysis of impacts to social conditions, as described in the text.

N/A Not applicable

4.8.1.2. Methods and Assumptions

The BLM used the Impact Analysis for Planning (IMPLAN) model to estimate socioeconomic impacts from BLM management actions under the alternatives. IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model estimate how a specific economic activity translates into jobs and income for the region. It includes the "ripple effect" (or "multiplier effect") of changes in sectors that management actions might not direct impact, but are linked to industries management actions directly impact. In IMPLAN, these ripple effects are called indirect impacts (for changes in industries that sell inputs to the directly affected industries) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

For example, an increase in oil and gas production implies more money would be spent on the maintenance of existing oil and gas equipment and/or new oil and gas equipment; in turn, this implies more money would be spent in sectors that provide inputs to oil and gas support services or in equipment sectors. These production and consumption, or "input-output," relationships allow IMPLAN to estimate indirect and induced impacts based on changes in production that could result under an alternative. Appendix L (p. 1477) provides technical assumptions and additional information about the IMPLAN model.

Analysts compared potential impacts to social conditions associated with each of the alternatives to existing conditions and trends in the planning area to establish a context for impacts. Analysts broadly categorized social impacts as follows: impacts to population; impacts to housing and community services; and impacts to custom, culture, and social trends.

Methods and assumptions used in this impact analysis include the following:

- Economic conditions, especially jobs, labor earnings, and economic output, will continue to influence population growth or decline in the planning area (although this is not the only driver; non-labor income is also important, as noted in the *Economic Conditions* section).
- Any population change that can reasonably be associated with the alternatives will likely be due to changes in employment opportunities.
- Federal, state, and local taxes will continue to be collected on minerals produced in the planning area.
- The pace and timing of economic development in the planning area will continue to depend on many factors beyond BLM management actions. Because the pace of development in the planning area is largely driven by external forces such as worldwide economic trends and technological changes, it is difficult to predict. Therefore, the economic impact analysis — which influences the social impact analysis because of the link between employment opportunities and population — assumes a relatively constant rate of development. Therefore, actual social and economic impacts could differ if the rate of development changes.

4.8.1.3. Detailed Analysis of Alternatives

The analysis of alternatives focuses on the impacts of BLM actions. It is important to note that many other events outside of BLM control could alter economic and social trends. For example, oil and gas prices might change as a result of an expansion or contraction of world or national economic activity, and this, in turn, could affect the pace or amount of development. Similarly, state and local laws regulating the subdivision of land could alter land ownership and development patterns, which may in turn affect open space and physical landscapes. Where the analysis finds that BLM actions would result in minimal or no change in social conditions, it does not necessarily mean that no change would occur; other forces influence changes in complex economic and social trends.

4.8.1.3.1. Impacts Common to All Alternatives

Humans and associated social and economic conditions are an integral part of ecosystem and community function in the planning area. Lifestyles, attitudes, beliefs, values, social structure, culture, and population characteristics affect and are affected by management actions such as those made by the BLM in the planning area. In addition, both planning area lands and BLM management of these lands have emotional meanings for many people. Varying viewpoints on economic development and conservation of natural resources are expected to cause controversy related to management of BLM-administered land and federal mineral estate.

Any population change that could reasonably be associated with the alternatives would likely be due to changes in employment opportunities. Employment opportunities related to activities on BLM-administered land and mineral estate include jobs in exploration, development, and production of minerals, including oil and gas, solid leasable minerals, and locatable and salable minerals; jobs in livestock production; and jobs in various recreation activities. The economic analysis provides quantitative estimates of employment in the planning area from oil and gas exploration and development, grazing, and recreation activities on BLM-administered lands and mineral estate. Analysts used these quantitative estimates to analyze the impacts of management on population.

The values associated with BLM-administered lands are comprised of market values and non-market values. Market values are those related to goods and services typically bought and sold in markets. For example, commodities such as oil, gas, bentonite, crops, and livestock products, and services such as outfitter trips and fishing guides, are traded in markets. The production and sale of these goods and services results in jobs and income, and the value of these goods to society can be readily expressed in monetary terms. Non-market values relate to things that people value, but are not generally bought or sold in a marketplace. For example, many people value the ability to see a mountain range from a certain vista point, without human-caused haze in the air. Some people value open vistas that lack structures, fences, wind turbines, or other signs of human development. Some people place a high value on their ability to hunt or fish on public lands, and the satisfaction they derive from this ability might exceed the equivalent monetary cost of purchasing the same amount of food from the grocery store or the amount of money they spend on gear. Other people value the knowledge that their great-great-grandchildren, should they choose to reside in Wyoming, would enjoy clean air, open vistas, and the ability to fish and hunt. The common feature of these values is that they are generally not bought and sold like tangible goods and services, and for that reason are difficult to assign a monetary value. Other examples of non-market values include the satisfaction people derive from resources such as clean water, threatened and endangered species, or cultural resources, or even the satisfaction they derive from the knowledge that BLM uses a particular fire management or INNS control regime.

Some of the value associated with open space and other features is captured in markets. For example, the price of a house that overlooks a pristine mountain range might be higher than the price of a house identical in almost every respect but overlooks a cement factory. However, the ability to see an open landscape while driving along a highway is not likely to be captured in the market. A related concept is that some changes in management could affect both market and non-market values. For example, industrial development that substantially alters the visual characteristics of the landscape might, over time, result in fewer tourists visiting the area from afar and spending money in local hotels, restaurants, and shops. This decline in tourism would result in adverse impacts to employment and income. Such industrial development also could reduce the satisfaction of local residents who value open space, and therefore would result in adverse impacts to non-market values. Conversely, new industrial development also would generate jobs and income, and the net effect – if all values were to be expressed in the same metric (dollars), could be positive or negative.

Although economists have developed approaches to assign a monetary value to things that are not traded in the marketplace, the approaches for doing so are often complex, controversial (due to the subjective native of assigning a dollar value to something that is neither bought nor sold), and require considerable resources and time to properly analyze and interpret. For example, stated-preference methods (surveys) are a common approach for placing a monetary value on clean air and open views. A survey might present people with images of a mountain vista with different degrees of haze superimposed, and ask people to express how much they would be willing to pay for the ability to see the vista with lower levels of haze for a certain number of days per year. However, research has shown that the survey design, sample size, and outreach methods can have a dramatic influence on the results. Furthermore, surveys are most effective when they focus on a single, specific type of non-market value and effects thereto (e.g., regional haze that affects visibility of a vista) rather than an agglomeration of effects (e.g., regional haze, industrial development on a landscape, clean water, preservation of cultural resources, preservation of wilderness, etc.). Due to the complexity and cost of implementing non-market valuation methods, quantifying these values is beyond the scope of this analysis. However, the BLM recognizes that changes in non-market values would be likely, and the severity of impacts would depend on the level of resource protection and development under each alternative. The development of oil and gas resources and other minerals, and development of ROWs, renewable energy facilities, and other structures, would likely result in adverse impacts to non-market values under all alternatives. Furthermore, alternatives that emphasize resource development over conservation likely would result in more impacts to non-market values.

Because of the close relationship between non-market economic values and how individuals in the planning area perceive their own quality of life, impacts to non-market values are discussed – qualitatively – under *Quality of Life and Local Culture*. Related to quality of life, it is important to note that a relatively large share of personal income in the planning area – especially in Fremont County (38 percent) and Hot Springs County (42 percent) – is from non-labor income. This means that a large proportion of the population in the planning area receives income from investments and dividends, and government transfer payments such as those from Social Security. To the degree that the local economy in these counties relies on non-labor income, and that people choose to retire to the area based on the quality of life available, overall quality of life – incorporating factors such as environmental amenities, cost of living, and cultural values – could result in a substantial impact to the continued economic viability and resilience of the counties.

With mounting economic pressures on the livestock sector, some ranch owners have raised money for retirement or other purposes by subdividing portions of their land into “ranchettes” and selling them to individuals. The sale of these ranchettes provides financial liquidity to ranchers who frequently have most of their assets in land, but generally results in increased building of fences, houses, and sometimes other structures (e.g., barns), changing the visual landscape. Under all alternatives, this trend would be likely to continue, because it is fundamentally related to (1) the nature of the ranching business (principally, the fact that most ranchers’ assets are in land, and the fact that profit margins are generally low and can turn negative in drought or other adverse conditions) and (2) state laws that govern property subdivision, under which county zoning laws cannot regulate subdivisions of 35 acres and larger. However, alternatives that would adversely impact the profitability of ranching could serve to increase this trend. Because the subdivision of ranch land affects local culture and quality of life, impacts to this trend are discussed under *Quality of Life and Local Culture*.

The economic and social analysis incorporates variations in pace of development over time. However, under all alternatives, the pace of development could differ from the rate assumed in the analysis. The BLM has limited control over the pace of development because it only authorizes economic activities such as oil and gas drilling, and does not perform these activities. An abrupt shift in the pace of development could result in short-term impacts (beneficial or adverse) to the demand for housing and community services, and to the supply of tax revenues from residences or businesses to support community services, due to short-term changes in job opportunities and the resulting change in in-migration or out-migration trends. Any such impacts would likely be more severe for smaller communities, which are less likely to be able to absorb a sudden influx of new residents, or to continue to support existing infrastructure if out-migration were to increase suddenly.

Under all alternatives, the BLM continues to consider socioeconomic impacts of site-specific actions and incorporates socioeconomic issues into analyses of environmental, social, and economic impacts, such as the NEPA-required analyses for site-specific actions.

4.8.1.3.2. Alternative A

Impacts to Population

As noted under *Impacts Common to All Alternatives*, changes in employment opportunities could result in changes to population and demographics. Under Alternative A, activities on BLM-administered land and mineral estate related to oil and gas, livestock grazing, and recreation would support an average of 3,622 full-time and part-time jobs per year (Table 4.49, “Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area” (p. 1185)), which represents approximately 2.9 percent of total employment in the planning area counties using 2007 employment statistics. The total number of supported jobs in oil and gas, livestock grazing, and recreation under Alternative A would be approximately 28 percent higher than under Alternative B, 5 percent higher than Alternative D, and approximately equal to Alternative C. It is important to note that this does not constitute an increase of 3,622 jobs per year over current employment; it more closely represents an estimate of the contribution of certain activities on BLM-administered lands and mineral estate to overall employment in the planning area.

As shown in the analysis of impacts to economic conditions, approximately 90 percent of the job opportunities from activities analyzed using the IMPLAN model would be related to oil and gas development and production (3,309 jobs). Livestock grazing would contribute approximately 5 percent of the job opportunities (180 jobs), and recreation would contribute the remainder (133 jobs). These jobs would be geographically dispersed across the planning area, because all three sectors operate across the planning area. BLM-administered lands provide recreational opportunities over the entire planning area, there are active oil and gas wells throughout the planning area, and livestock grazing is authorized on BLM-administered lands throughout the planning area. The average annual number of jobs supported by recreation activities would be lower under Alternative A than Alternative B; however, oil and gas development and production would support approximately 30 percent more average annual jobs than Alternative B, and livestock grazing would support approximately 23 percent more jobs.

Job opportunities (and resulting increases or shifts in population) would likely concentrate in population centers such as Lander and Riverton, and especially in oil and gas service centers such as Casper, Rock Springs, and Green River. Management under Alternative A might not result in noticeable impacts to the current distribution of job opportunities in the planning area for several reasons. First, Alternative A maintains current management. Second, the current contribution of economic activity on BLM-administered lands accounts for a relatively small proportion of jobs in the planning area (2.9 percent, according to the IMPLAN analysis of oil and gas, livestock grazing, and recreation under Alternative A). Lastly, the IMPLAN analysis considers jobs in all sectors – including industries directly affected by BLM actions (e.g., mining) and those indirectly affected (e.g., retail jobs created by expenditures of workers in various industries). As a result, Alternative A would not alter the overall trend of BLM-authorized activities and associated population changes in the planning area.

Impacts to Housing and Community Development

Changes in population have the potential to change the demand for housing and community services such as roads, schools, and police and fire protection. As described in Chapter 3, county-wide vacancy rates in 2000 (the latest year for which data are available) were 26 percent in Carbon County, 13 percent in Fremont County, 17 percent in Hot Springs County, 10 percent in Natrona County, and 11 percent in Sweetwater County. These percentages represent approximately 2,200 vacant units in Carbon, 2,000 vacant units in Fremont, 400 in Hot Springs, 3,000 in Natrona, and 1,800 in Sweetwater counties. Vacancy rates for rental properties in the planning area have declined since 2001-2002. However, because Alternative A would not change the direction of current BLM management, it would not be expected to result in changes to either the total demand for housing and community services or its geographic distribution.

As noted under *Impacts Common to All Alternatives*, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts to demand for housing and community services, and to the supply of tax revenues from residences or businesses to support community services. It would likely be more difficult for smaller communities to absorb sudden changes of this nature. If national and international energy prices, operator business strategies, or other factors lead to a rapid pace of development, there could be sudden short-term increases in demand for community services as a result of new jobs and increased population. However, local and state tax revenues collected from energy production could help mitigate short-term increases in demand for services, because tax revenues help pay for community services.

Impacts to Quality of Life and Local Culture

Historically, the communities in the planning area developed around a combination of resource-based industries, ranching, trade and commerce, and providing supplies and services to tourists. Quality of life for the people who live in the planning area depends on continued economic opportunities and features of the natural landscape. Alternative A will maintain existing BLM policies in their present state. Historically, these policies have contributed, along with other government policies and the actions of private firms and residents, to economic viability and resilience in the planning area. Alternative A would not preclude other forces (beyond BLM-authorized actions) from driving any changes to the economic, physical, and social conditions in the planning area.

Although there are groups with particular interests regarding specific land uses (e.g., wilderness advocates, oil and gas interests, and ranchers), overall, the residents of the planning area tend to support both conservation of natural resources and the economic viability of resource-based industries. For this reason, residents generally support multiple use of BLM-administered lands, including the development of mineral and energy resources, livestock grazing authorizations, continued access to BLM-administered lands for recreation, and conservation of wildlife and native vegetation. Alternative A would continue current BLM management for multiple uses without a particular emphasis on conservation (as there would be under Alternative B) or resource use and development (as there would be under Alternative C).

Under Alternative A, continued development of oil and gas wells, ROWs, and other human-made structures on the landscape would continue to result in decreases in non-market values associated with open space and wilderness. Because the alternative essentially represents continuation of current management actions, these decreases would likely be consistent with historic trends. Under this alternative, subdivision of ranch land and related development and sale of ranchette parcels would continue, again generally consistent with historic trends.

As indicated under *Impacts Common to All Alternatives*, under this alternative, as under all the alternatives, the BLM would continue to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions.

4.8.1.3.3. Alternative B

Impacts to Population

Under Alternative B, activities on BLM-administered land and mineral estate related to oil and gas, livestock grazing, and recreation would support an average of 2,621 full-time and part-time jobs per year, which represents approximately 2.1 percent of total employment in the planning area as of 2007 (Table 4.49, "Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area" (p. 1185)). Compared to Alternative A, which essentially represents the continuation of current trends, this represents a decrease of 1,000 jobs (approximate 28 percent decrease), or approximately 0.8 percent of employment using 2007 employment statistics. These job losses would relate to restrictions on development of oil and gas resources and restrictions on grazing; Alternative B would generate more jobs related to recreation. It is possible that more oil and gas wells would be drilled on nearby state or private land, partially compensating for the projected employment decrease.

A decrease in employment opportunities could result in a decrease in population in the planning area because people might leave the area to seek employment elsewhere. The expected magnitude of any such decrease would be similar to the magnitude of employment loss. However, the anticipated loss in population would likely be lower because some people (e.g., retired people) do not depend directly on employment for their economic well being. In addition, an action that results in decreased employment opportunities and improved environmental quality could result in more retirees or other people moving to the area, or remaining there for longer. Because these people support themselves on unearned income and do not depend directly on employment for their economic survival, a policy designed to enhance environmental quality may lead to more of these people moving in or less moving out. In other words, if 0.8 percent of employed people and their families left the planning area, it could be argued that the population would likely decrease by less than 0.8 percent because there would be some offset to the indirect and induced employment impact of this alternative attributable to those residents attracted to the planning area who are retired or otherwise non-working.

As noted in the *Economic Conditions* section, approximately 88 percent of the job opportunities from activities analyzed using the IMPLAN model would be related to oil and gas development and production under Alternative B (2,305 jobs). Livestock grazing would contribute approximately 5 percent of the job opportunities (139 jobs), and recreation would contribute another 7 percent (178 jobs). These jobs would be geographically dispersed across the planning area, as under Alternative A. Compared to Alternative A, Alternative B would generate approximately 33 percent more jobs in recreation, but 23 percent fewer jobs in livestock grazing and 30 percent fewer jobs in oil and gas exploration and production.

Job opportunities and job losses (and resulting shifts in population) under Alternative B would be concentrated primarily in population centers. Because most job losses under Alternative B would be related to decreased oil and gas development, any population changes would focus on areas that service oil and gas fields, such as Rock Springs and Casper. There are oil and gas fields throughout the planning area, and overall, the distribution of any job losses would likely occur throughout the planning area. In addition, the IMPLAN analysis considers jobs in all sectors – including industries BLM actions directly affect (e.g., mining) and those that BLM actions indirectly affect (e.g., retail jobs created by expenditures of workers in various industries). As a result, Alternative B would not alter the overall trend of BLM-authorized activities and associated population changes in the planning area.

Impacts to Housing and Community Services

Alternative B could result in decreased population compared to other alternatives, which could result in decreased demand for housing and community services. However, using the same argument presented in the Alternative A narrative, these impacts may be somewhat mitigated by the emphasis on enhancing environmental quality. Alternative B also would result in a reduced tax base for providing community services, as described in the *Economic Conditions* section. The geographic distribution of these changes is difficult to predict because tax losses in specific jurisdictions are driven by oil and gas well locations. There is oil and gas potential throughout the planning area, and the RFD does not predict specific well locations (BLM 2009d).

Impacts to Quality of Life and Local Culture

As described for Alternative A, quality of life for the people who live in the planning area depends on continued economic opportunities and features of the natural landscape. Alternative B would reduce economic opportunities, but would also result in decreased air pollution and other adverse environmental impacts associated with oil and gas development compared to alternatives A, C, and D.

As noted for Alternative A, residents generally support multiple use of BLM-administered lands, including the development of mineral and energy resources, livestock grazing authorizations, continued access to BLM-administered lands for recreation, and conservation of wildlife and native vegetation. Alternative B would continue the BLM current practice of allowing multiple uses, but would prioritize resource conservation over resource uses such as oil and gas development. This might be inconsistent with the culture advocated by some interest groups (e.g., oil and gas interests) and could promote the culture advocated by others (e.g., wilderness advocates).

Under this alternative, continued development of oil and gas wells, ROWs, and other human-made structures on the landscape would continue to result in decreases in non-market values associated with open space and wilderness. However, because this alternative emphasizes resource conservation, the magnitude of these decreases would be less than historic trends and less than under Alternative A. Under Alternative B, subdivision of ranch land and related development and sale of ranchette parcels would continue. This continuation could be more intense than historic trends because Alternative B would likely result in measurable impacts to allotments for many operations that use federal land for forage.

4.8.1.3.4. Alternative C

Impacts to Population

Under Alternative C, activities on BLM-administered land and mineral estate related to oil and gas, livestock grazing, and recreation would support an average of 3,617 full-time and part-time jobs per year (Table 4.49, “Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area” (p. 1185)), which represents approximately 2.9 percent of total employment in the planning area using 2007 employment statistics. Compared to Alternative A, which essentially represents the continuation of current trends, Alternative C would result in approximately the same number of jobs (a decrease of five jobs). Alternative C would generate slightly fewer jobs in livestock grazing and recreation, and slightly more jobs related to the development of oil and gas resources.

As noted in the *Economic Conditions* section, approximately 92 percent of the job opportunities from activities analyzed using the IMPLAN model would be related to oil and gas development and production (3,324 jobs). Livestock grazing would contribute approximately 5 percent of the job opportunities (170 jobs), and recreation would contribute the remainder (123 jobs). These jobs would be geographically dispersed across the planning area, as described for Alternative A.

Compared to Alternative A, this alternative would result in essentially the same number of jobs, based on the IMPLAN results. Likewise, compared to Alternative A, a change in population would not be expected. Moreover, while the IMPLAN results suggest slight job declines in both livestock grazing and recreation, and a minor increase in oil and gas, these changes would not have a measurable impact on the population distribution compared to current conditions and historic trends, for the same reasons described under Alternative A.

Impacts to Housing and Community Services

Alternative C would result in about the same population and, therefore, about the same demand for housing and community services as Alternative A. Alternative C would result in essentially an identical tax base for providing these services, as described in the *Economic Conditions* section.

Impacts to Quality of Life and Local Culture

Alternative C would result in about the same economic opportunities in the planning area as Alternative A. However, because of the greater emphasis on resource use under Alternative C, it could result in additional adverse impacts to air quality, wildlife, and other resources that improve quality of life related to natural characteristics.

Alternative C will continue BLM current practice of allowing multiple uses, but prioritizes the use of resources such as oil and gas development over the conservation of resources such as air quality and wildlife. This might be consistent with the culture advocated by some interest groups (e.g., oil and gas interests) and inconsistent with the culture advocated by others (e.g., wilderness advocates).

Under this alternative, continued development of oil and gas wells, ROWs, and other human-made structures on the landscape would continue to result in decreases in non-market values associated with open space and wilderness. However, because this alternative emphasizes resource development, the magnitude of these decreases would be greater than historic trends and greater than impacts under Alternative A. Under Alternative C, subdivision of ranch land and related development and sale of ranchette parcels would continue. This continuation would generally be consistent with historic trends, because Alternative C would result in relatively little impact to the economics of ranching.

4.8.1.3.5. Alternative D

Impacts to Population

Under Alternative D, activities on BLM-administered land and mineral estate related to oil and gas, livestock grazing, and recreation would support an average of 3,423 full-time and part-time jobs per year (Table 4.49, "Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area" (p. 1185)), which represents approximately 2.8 percent of total employment in the planning area using 2007 employment statistics. Compared to Alternative A, which essentially represents the continuation of current trends, Alternative D would result in a small decrease in the number of jobs. Alternative D would result in slightly fewer jobs in livestock grazing and the development of oil and gas resources, and slightly more jobs related to recreation.

The decrease in employment opportunities, which amounts to 0.1 percent of current employment, could result in a small decrease in population in the planning area as people leave the area in search of work elsewhere. A decrease in employment opportunities could result in a decrease in population in the planning area because people might leave the area to seek employment elsewhere. The expected magnitude of any such decrease would be similar to the magnitude of employment loss. However, the anticipated loss in population would likely be lower because some people (e.g., retired people) do not depend directly on employment for their economic well being. In addition, an action that results in decreased employment opportunities and improved environmental quality could result in more retirees or other people moving to the area, or remaining there for longer. Because these people support themselves on unearned income and do not depend directly on employment for their economic survival, a policy designed to enhance environmental quality may lead to more of these people moving in or less moving out. In other words, if 0.1 percent of employed people and their families left the planning area, it could be argued that the population would likely decrease by less than 0.1 percent because there would be some offset to the indirect and induced employment impact of this alternative attributable to those residents attracted to the planning area who are retired or otherwise non-working.

As noted in the *Economic Conditions* section, approximately 91 percent of the job opportunities from activities analyzed using the IMPLAN model would be related to oil and gas development and production (3,109 jobs). Livestock grazing would contribute approximately 5 percent of the job opportunities (163 jobs), and recreation would contribute the remainder (152 jobs). These jobs would be geographically dispersed across the planning area, similar to Alternative A.

Alternative D would result in a population similar to Alternative A, with relatively small changes overall. Therefore, Alternative D would not substantially affect population distribution, increase, or movement compared to current conditions and historic trends, for the reasons described under Alternative A.

Impacts to Housing and Community Services

Alternative D would result in about the same population and, therefore, about the same demand for housing and community services as Alternative A. Alternative D would result in a slightly smaller tax base for providing these services, as described in the *Economic Conditions* section. The geographic distribution of these changes is not possible to predict because higher tax revenues in specific jurisdictions are driven by oil and gas well locations. There are oil and gas resources throughout the planning area, and the RFD does not predict specific well locations (BLM 2009d).

Impacts to Quality of Life and Local Culture

Alternative D would result in about the same economic opportunities in the planning area as Alternative A. However, it would also result in some beneficial impacts to air quality, wildlife, and other resources that improve quality of life related to natural characteristics. The balanced management approach under Alternative D could increase the quality of life in the long term and increase the economic viability and sustainability of communities.

Alternative D balances the use of resources such as oil and gas reserves with the conservation of resources such as air quality, open space, and wildlife habitat. The balanced use approach is intended to support the culture advocated by some interest groups (e.g., oil and gas interests) and interest groups (e.g., wilderness advocates). Alternative D provides for resource development and associated job opportunities while managing for non-market values associated with open space and natural characteristics.

Under this alternative, subdivision of ranch land and related development and sale of ranchette parcels would continue. This continuation would generally be consistent with historic trends, because Alternative D would result in relatively little impact to the economics of ranching.

4.8.2. Economic Conditions

This section addresses the potential for the alternatives to impact economic conditions in the planning area, including direct, indirect, short-term, and long-term impacts. Appendix A (p. 1343) identifies laws, Executive Orders, regulations, policies, and guidance considered in the analysis of economic conditions.

Potential impacts to economic conditions include changes in regional economic output, employment, and earnings, and in tax revenues for local, state, and federal governments. In terms of economic modeling analysis, direct and indirect impacts are assumed to occur simultaneously, although in reality these impacts could take time to work their way through the economic sectors in the analysis area. For example, an action to permit gas exploration and production could result in the direct infusion of money into several economic sectors, and indirect infusions into related sectors such as retail, accommodation and food services, and education and other social services. In economic modeling, these impacts are assumed to occur instantaneously. Moreover, continued direct infusion of money into the planning area's economy created by the decision to lease oil and gas is analyzed over the life of the project, which in this case represents a multi-year period of production. Therefore, the analysis is designed to account for the economic activity produced by planning decisions over time. The impacts are estimated on an annual basis through 2027, based on the estimated annual direct impact of the alternatives.

Although the transfer of money from directly and indirectly affected sectors is assumed to be instantaneous (by the structure of the model), the model does incorporate gradual changes in the economy based on the gradual development of the various resources under the alternatives. For example, impacts to grazing allotments from surface-disturbing actions are expected to occur gradually over 20 years, and the drilling of new oil and gas wells is expected to occur gradually over a similar period. Appendix L (p. 1477) provides details about the time-phasing assumptions for resource development, loss of AUMs for livestock grazing, and other changes.

4.8.2.1. Summary of Impacts

Based on results from the IMPLAN model used to quantify economic activity measured by sectoral output, earnings, and employment in conjunction with estimated tax revenues and a qualitative analysis of activities on BLM-administered land and mineral estate, the impacts associated with alternatives A and C would be almost identical. Earnings, output, employment, and tax revenues would be somewhat lower under Alternative D, and substantially lower under Alternative B. Much of the difference is from projected oil and gas activity (highest under alternatives A and C). Earnings, output, and employment from recreation would be highest under Alternative B, second highest under Alternative D, and about the same under alternatives A and C. Economic activity related to grazing would be highest under Alternative A, lowest under Alternative B, and about the same under alternatives C and D, which are slightly lower than Alternative A. Economic activity related to other sectors not modeled using IMPLAN, including renewable energy, locatable minerals, and salable minerals, would be similar across all the alternatives, at least in the first 5 to 10 years of the planning period. In the latter half of the planning period, economic activity from renewable energy could be somewhat higher under alternatives A and C compared to alternatives B and D; however, the overall amount of activity is uncertain.

Table 4.47, “Comparison of Projected Earnings and Employment” (p. 1181) compares projected earnings and employment related to activities on BLM-administered lands to the levels in 2007 for the five-county region. As the table shows, Alternative A would result in about $196 million in earnings annually, and 3,622 jobs annually, from BLM-administered land and resources. Alternative B would generate about $139 million in earnings and 2,621 jobs; Alternative C would generate approximately $196 million in earnings and 3,617 jobs; and Alternative D would generate about $184 million in earnings and 3,424 jobs. Therefore, alternatives A and C would result in about the same amount of earnings and employment, and both would be somewhat higher than under Alternative B and slightly higher than under Alternative D.

It is useful to compare the differences in earnings and employment across alternatives not only in absolute terms, but also to the size of the regional economy. The earnings associated with Alternative A, compared to 2007 earnings for the planning area counties, represent about one-fourtieth (2.5 percent) of the magnitude of those earnings. The average employment associated with BLM-administered lands under Alternative A represents a little less than one-thirty-fifth of employment in year 2007, or 2.9 percent. Earnings associated with BLM-administered lands under alternatives B, C, and D, respectively, would constitute 1.8, 2.5, and 2.4 percent of year 2007 earnings. Employment associated with BLM-administered lands under alternatives B, C, and D constitute 2.1, 2.9, and 2.8 percent of employment in year 2007. This provides a useful perspective on the relative importance of BLM-administered lands in the overall regional economy, and also shows that the differences among alternatives – in relation to the regional economy – would be relatively small. For example, the difference in earnings projected under alternatives A and D would be just 0.1 percent of earnings in year 2007 (2.5 minus 2.4), which would be barely noticeable from a statistical perspective, and would not lead to wholesale changes in regional economic activity. Other national, state, and regional policies and trends, such as the value of the dollar, federal fiscal and monetary policy, and global oil and gas prices, would result in a substantially larger impact to economic activity in the planning area.

Table 4.47. Comparison of Projected Earnings and Employment

Measure	Alternative A	Alternative B	Alternative C	Alternative D
Forecasted annual earnings due to activities on BLM-administered surface[1]	$195.6	$138.8	$195.9	$184.2
Total labor earnings in 2007 dollars	$7,718	$7,718	$7,718	$7,718
Forecasted annual earnings as a percentage of 2007 earnings	2.5%	1.8%	2.5%	2.4%
Forecasted annual employment due to activities on BLM-administered surface[1]	3,622	2,621	3,617	3,424
Total employment in 2007 dollars	123,377	123,377	123,377	123,377
Forecasted annual employment as a percentage of 2007 employment	2.9%	2.1%	2.9%	2.8%

Source: Forecasted annual earnings and employment are calculated based on the IMPLAN model, as described in the text. Earnings and employment for 2007, for the five planning area counties, are from BEA 2009. Earnings are in millions of year 2007 dollars.

[1] Estimate of annual earnings and employment includes direct, indirect, and induced economic activity (the "multiplier effect").

IMPLAN Impact Analysis for Planning Model

4.8.2.2. Methods and Assumptions

The analysis in this section is based on the IMPLAN model as described at the beginning of the *Social Conditions* section. IMPLAN focuses on all market transactions within the study area and serves as a tool for quantifying the earnings and employment associated with a given BLM alternative. However, it does not address benefits and costs nor does it address non-market impacts. It also does not specifically address the issues involved with non-earned income. This is an important consideration because some parts of the planning area, such as Fremont County, derive almost 40 percent of personal income from non-labor sources; in Hot Springs County, non-labor income accounts for more than 40 percent of personal income. From a public land policy perspective, it is important to recognize this distinction when interpreting the IMPLAN results.

Methods and assumptions used in this impact analysis include the following:

- Employment, earnings, and output continue to influence economic and population change in the planning area (although non-labor income also is a key influence, particularly in Fremont and Hot Springs counties, as noted immediately above).
- Economic benefits to the planning area accrue from BLM-influenced activities, such as oil and natural gas development, livestock grazing, and recreation. Economic benefits to the planning area also accrue from wildlife grazing, to the extent that wildlife grazing contributes to the availability of and demand for recreational activities.

- Indirect and induced benefits due to minerals, livestock grazing, and recreation can reasonably be estimated by the IMPLAN model. (The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the planning area.)
- Residents spend money on recreation in the planning area, but this does not represent new money coming into the planning area; therefore, the analysis of economic impacts from recreation considers only recreation expenditures of nonresidents in the five-county planning area. In other words, there is a multiplier effect associated with nonresident recreation-related spending because it results in an input of new money into the planning area. By comparison, it is assumed that recreation-related expenditures of people who live in the planning area will generally be spent in the area (although not necessarily on the same activities), given the set of possible management actions represented by the range of alternatives analyzed.
- For livestock grazing, the analysis reflects a “worst-case” assumption that all acres affected by surface-disturbing actions (from all the sources listed in Appendix T (p. 1535)) are lands currently authorized for grazing. Therefore, the number of acres available for grazing in 2027 is the number of acres currently available, minus acres affected in the long term by surface-disturbing actions. In addition, the analysis of grazing reflects the assumption that surface-disturbing actions occur at a constant rate over time.
- For livestock grazing, the analysis of baseline AUMs available and reductions in AUMs is adjusted for the ratio of actual use to permitted use, which is calculated based on the long-term average of authorized and permitted AUMs for the planning area from 1989 to 2008. This long-term average is 73 percent. For Alternative B, because there would be a substantial reduction in permitted AUMs, the estimated ratio of actual use to permitted use would be somewhat higher, moving steadily from 73 percent in the first year of analysis to 95 percent in the final year of analysis. Appendix L (p. 1477) provides more details regarding this adjustment. The data used for Alternative D for IMPLAN reflected AUM levels equal to Alternative C. However, as environmental analysis of the impacts from other management actions was assessed, BLM determined that over time there would be a reduction in AUMs in Alternative D to meet rangeland health standards in places with high resource conflict.

The pace and timing of economic development in the planning area depends on many factors beyond BLM management. These include national and international energy demand, supply, and prices; operator business strategies; production conditions in the planning area; and demand and supply for agricultural products. Because the pace of development in the planning area is driven largely by external forces such as worldwide economic trends and technological changes, it is difficult to predict. Therefore, this analysis assumes a relatively constant rate of development, and actual impacts might differ (e.g., there could be boom-and-bust type short-term impacts) if the rate of development changes substantially.

The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the planning area. As a result, the calibrated model does a better job of generating multipliers and the subsequent impacts that reflect the interaction between and among the sectors in the planning area compared to a model using unadjusted national coefficients. Specifically, worker productivity in oil and gas production is higher in Wyoming than nationally, and more of the hay used for livestock feed is produced in the planning area, compared to national averages. Key variables used in the IMPLAN model were filled in using data specific to Wyoming, including employment estimates, labor earnings, and total industry output.

4.8.2.3. Detailed Analysis of Alternatives

4.8.2.3.1. Impacts Common to All Alternatives

The focus of the this analysis is the resource activities that land management decisions would most likely impact, including oil, gas, livestock grazing, and recreation. Actions from resource programs or constraints (as described for each alternative) that impact oil, gas, livestock grazing, and recreation (e.g., surface-disturbing activities that impact the amount of land available for grazing) are included by implication. Also included by implication are restrictions on ROWs and corridors, because the RFD scenario for oil and gas, which provides estimated numbers of oil and gas wells and production, incorporates the restrictions on ROWs and corridors (BLM 2009d). Restrictions on new ROWs tend to be a negligible factor in the decision to develop additional oil and gas wells in fields that are already producing, but could be an important factor in a decision to develop a new field.

Among renewable energy sources, wind and likely also solar have moderate potential in the planning area; geothermal energy has low potential, and the primary potential for biomass energy is from a pine-beetle kill. The primary drivers of the pace of wind-energy development will be market forces and policy variables outside the scope of this RMP. BLM decisions regarding management of BLM-administered land would result in some impacts in relation to economic opportunities related to wind-energy development, but the influence of BLM RMP decisions would be small in relation to the influence of market conditions and policies.

Changes in economic activity impact federal, state, and local tax revenues. While all sectors of the economy contribute to tax revenues, the analysis of impacts to tax revenues focuses on oil and gas production, because almost all of the measurable variation in economic activity among alternatives is in oil and gas.

The focus of the analysis is on regional earnings and output, employment, and tax revenue, with the region defined as the five-county planning area. The IMPLAN model is run at a regional (multi-county) scale, with the mathematical relationships that describe linkages between sectors aggregated to the five-county level. Because of this mathematical aggregation, it is not possible to identify total economic impacts for an individual community. For additional information on the structure of the IMPLAN model and specific assumptions made for the economic modeling analysis, refer to Appendix L (p. 1477).

4.8.2.3.2. Alternative A

Impacts to Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative A for the modeled sectors (oil and gas, grazing, and recreation) would average approximately $196 million per year between 2008 and 2027, and regional output would average approximately $1,556 million per year, resulting from development and activities on BLM-administered land and mineral estate. The net present value of the stream of regional output, discounted at a 7 percent real discount rate (Office of Management and Budget 1992) would be approximately $15.3 billion over 20 years. Table 4.48, “Average Annual Impacts on Earnings and Output, by Sector and Alternative for the Planning Area” (p. 1184) summarizes and compares sector-level breakouts for earnings and output by alternative.

Regarding renewable-energy development, Alternative A maintains the current management approach of permitting renewable-energy development on a case-by-case basis. This could result in adverse impacts by increasing uncertainty for individual firms considering developing renewable energy in the planning area. Increased uncertainty can hinder development compared to having a well-established process. The market for wind energy is growing; however, the lack of transmission lines between areas of high wind-energy potential and population centers is still an issue that must be overcome before large-scale wind-energy generation would occur (see the *Renewable Energy* section for details). Because the renewable-energy market is still developing and necessary transmission infrastructure is lacking, long-term impacts to the regional economy related to renewable-energy development under Alternative A are uncertain. However, new energy-generation projects take several years to obtain financing and permitting – even where transmission lines exist – so it is likely that any economic impacts related to renewable energy policy would be relatively small for at least the first 5 to 10 years of the planning period.

Regarding economic activity associated with locatable mineral development and mineral materials disposals, the BLM generally expects to meet market demand and respond to applications and does not anticipate that the production of these minerals would vary across alternatives. Alternative A, in particular, will maintain the current management approach to leasing BLM-administered lands for exploration and development, and would likely not result in impacts compared to current conditions.

Impacts to Employment

Employment is a function of the level of economic activity (sales and purchases) among and between economic sectors. Therefore, impacts to employment are closely related to impacts to economic output. An increase in output implies an increase in employment, and vice versa.

Based on the IMPLAN model, regional employment under Alternative A for the modeled sectors would average approximately 3,622 jobs per year between 2008 and 2027 due to activities on BLM-administered lands and mineral estate. Note that the number of jobs is expressed as “annual job equivalents,” where one annual job equivalent represents 12 months of employment. For example, 1 annual job equivalent could represent 2 jobs for 6 months each, or 1 job for 12 months. Annual job equivalents can represent full-time or part-time jobs. Table 4.49, “Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area” (p. 1185) provides information on how these jobs break out by sector.

Note that the data in Table 4.48, “Average Annual Impacts on Earnings and Output, by Sector and Alternative for the Planning Area” (p. 1184) and the other tables in this section showing the results of the economic model analysis, reflect direct, indirect, and induced impacts to economic conditions. For example, earnings and employment figures are for the oil and gas, livestock grazing, and recreation sectors, and all other sectors that relate to those sectors in the interlinkages of the economy, such as retail, food service, hotels and other accommodation services, and social services, such as education and health care.

Table 4.48. Average Annual Impacts on Earnings and Output, by Sector and Alternative for the Planning Area

Sector	Alternative A	Alternative B	Alternative C	Alternative D
Impacts on Average Earnings (millions of 2007 $)				
Oil and Gas	$187.1	$130.6	$188.0	$175.8
Livestock Grazing	$5.6	$4.3	$5.3	$5.0

Sector	Alternative A	Alternative B	Alternative C	Alternative D
Recreation	$2.9	$3.9	$2.7	$3.3
Total	$195.6	$138.8	$195.9	$184.2
Impacts on Annual Average Output (millions of 2007 $)				
Oil and Gas	$1,524.8	$1,029.1	$1,531.7	$1,425.9
Livestock Grazing	$19.1	$14.7	$18.0	$17.3
Recreation	$12.0	$16.1	$11.0	$13.8
Total	$1,555.8	$1,059.9	$1,560.8	$1,457.0
Impacts on Net Present Value of Output Over 20 Years (millions of 2007 $)				
Oil and Gas	$14,959	$10,109	$15,027	$13,991
Livestock Grazing	$202	$164	$194	$187
Recreation	$111	$141	$104	$125
Total	$15,273	$10,414	$15,325	$14,303
Source: Calculated using the IMPLAN model, as described in the text. Detail may not add to total due to rounding. [1] Net Present value from 2008 to 2027, discounted at 7 percent (rate from Office of Management and Budget 1992)				

Table 4.49. Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area

Sector	Number of Jobs			
	Alternative A	Alternative B	Alternative C	Alternative D
Oil and Gas	3,309	2,305	3,324	3,109
Livestock Grazing	180	139	170	163
Recreation	133	178	123	152
Total	3,622	2,621	3,617	3,424
Source: Calculated using the IMPLAN model, as described in the text. Detail may not add to total due to rounding. IMPLAN Impact Analysis for Planning Model				

Average annual earnings per job would differ for each of these sectors. Based on the IMPLAN model, earnings per job (expressed in year 2007 dollars) would average:

- Approximately $58,000 for jobs in oil and gas well drilling and completion.
- Approximately $55,000 for jobs in oil and gas production.
- Approximately $31,000 for jobs associated with cattle and sheep grazing.
- Between $20,000 and $22,000 for recreation-related jobs.

Impacts to Tax Revenue

Projected tax revenues under Alternative A due to oil and gas production on federal surface would average $133.2 million per year for federal royalties, $63.9 million per year for state severance taxes, and $72.5 million per year for local ad valorem taxes. Because of limited data on specific locations of projected wells, there is not enough data to apportion the local tax receipts to individual communities. Table 4.50, “Estimated Oil and Gas Tax Revenues by Alternative for the Planning Area” (p. 1186) summarizes and compares tax revenues from oil and gas production under the alternatives. Alternative A would result in a higher estimated oil and gas tax revenue compared to Alternative B, slightly higher than Alternative D, and slightly less than Alternative C.

Table 4.50. Estimated Oil and Gas Tax Revenues by Alternative for the Planning Area

Tax Type	Alternative A	Alternative B	Alternative C	Alternative D
Federal Mineral Royalties	$133.2	$88.5	$133.8	$124.3
State Severance Taxes	$63.9	$42.5	$64.2	$59.6
Local Ad Valorem Production Taxes	$72.5	$48.2	$72.8	$67.6
Total	$269.6	$179.1	$270.8	$251.5

Source: Calculated based on the IMPLAN model and state, federal, and local tax rates, as described in the text. Detail may not add to total due to rounding.
IMPLAN Impact Analysis for Planning model

4.8.2.3.3. Alternative B

Impacts to Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative B for the modeled sectors (oil and gas, grazing, and recreation) would average approximately $139 million per year between 2008 and 2027, and regional output would average approximately $1,060 million per year due to activities on BLM-administered lands and mineral estate. The net present value of the stream of regional output, discounted at a 7 percent real discount rate (Office of Management and Budget 1992), would be approximately $10.4 billion over 20 years. Table 4.48, "Average Annual Impacts on Earnings and Output, by Sector and Alternative for the Planning Area" (p. 1184) summarizes and compares sector-level breakouts for earnings and output by alternative.

Alternative B excludes 2.3 million acres from renewable-energy development, and manages an additional 24,000 acres as avoidance areas for renewable energy. Alternative B opens approximately 41,000 acres to renewable-energy development, a decrease of approximately 98 percent in area open for renewable-energy development compared to Alternative A. For wind-energy generation proposals for the open area, the change in management would decrease uncertainty for firms considering developing renewable energy in the planning area. However, because Alternative B restricts or excludes renewable-energy development in a much larger portion of the planning area (compared to the potential for being open under Alternative A), there would likely be less economic activity associated with renewable-energy development under Alternative B than Alternative A. As noted for Alternative A, transmission infrastructure is generally lacking; however, the market for wind-energy is growing. Therefore, the regional economic impact related to renewable-energy development under Alternative B is uncertain, but likely to be lower in the long term than under Alternative A. In any case, due to the long time horizon associated with energy project planning and permitting, there would likely be no observable difference in economic impacts due to renewable-energy development between alternatives for at least the first 5 to 10 years of the planning period.

Regarding economic activity associated with locatable mineral development and mineral materials disposals, the BLM generally expects to meet market demand and respond to applications and does not anticipate that the production of these minerals would vary across the alternatives. Alternative B restricts the amount of land open to exploration and development of these minerals, as documented in the *Mineral Resources* section. However, this restriction would result in a minor impact to economic conditions compared to current conditions.

Impacts to Employment

Employment is a function of the level of economic activity (sales and purchases) among and between economic sectors. Therefore, impacts to employment impacts are closely related to impacts to economic output. An increase in output implies an increase in employment, and vice versa.

Based on the IMPLAN model, regional employment under Alternative B for the modeled sectors would average approximately 2,621 jobs per year between 2008 and 2027 due to activities on BLM-administered lands and mineral estate. Table 4.49, "Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area" (p. 1185) provides information on how these jobs break out by sector. Average annual earnings per job would be the same under Alternative B as Alternative A, and are described above.

Impacts to Tax Revenue

Projected tax revenues under Alternative B due to oil and gas production on federal surface would average $88.5 million per year for federal royalties, $42.5 million per year for state severance taxes, and $48.2 million per year for local ad valorem taxes. Because of limited data on specific locations of projected wells, there is not enough data to apportion the local tax receipts to individual communities. Table 4.50, "Estimated Oil and Gas Tax Revenues by Alternative for the Planning Area" (p. 1186) summarizes and compares tax revenues from oil and gas production under the alternatives. Alternative B would result in the least amount of estimated oil and gas tax revenues compared to the other alternatives.

4.8.2.3.4. Alternative C

Impacts to Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative C for the modeled sectors (oil and gas, grazing, and recreation) would average approximately $196 million per year between 2008 and 2027, and regional output would average approximately $1,561 million per year due to activities on BLM-administered lands and mineral estate. The net present value of the stream of regional output, discounted at a 7 percent real discount rate (Office of Management and Budget 1992), would be approximately $15.3 billion over 20 years. Table 4.48, "Average Annual Impacts on Earnings and Output, by Sector and Alternative for the Planning Area" (p. 1184) summarizes and compares sector-level breakouts for earnings and output by alternative.

Alternative C manages approximately 94,000 acres as renewable-energy development exclusion areas, and manages approximately 16,000 acres as renewable energy avoidance areas. Approximately 2.3 million acres will be open to renewable-energy development under Alternative C, an increase of 8 percent compared to Alternative A. The change in management would increase renewable-energy development compared to alternatives A and B, because it would decrease uncertainty for firms considering developing renewable energy in the planning area, and would provide more opportunity in terms of open lands. As noted in the discussion for Alternative A, transmission infrastructure is generally lacking; however, the market for wind energy is growing. Therefore, the long-term regional economic impact related to renewable-energy development under Alternative C is uncertain, but it would almost certainly be greater than under alternatives A and B. However, due to the long time horizon associated with energy project planning and permitting, there would likely be no observable difference in economic impacts due to renewable-energy development between alternatives for at least the first 5 to 10 years of the planning period.

Regarding economic activity associated with locatable mineral development and mineral materials disposals, the BLM generally expects to meet market demand and respond to applications and does not anticipate that the production of these minerals would vary across the alternatives. Alternative C increases the amount of land open to exploration and development of these minerals, as documented in the *Mineral Resources* section. However, this restriction would likely result in a minor impact to economic conditions compared to current conditions.

Impacts to Employment

Employment is a function of the level of economic activity (sales and purchases) among and between economic sectors. Therefore, impacts to employment are closely related to impacts to economic output. An increase in output implies an increase in employment, and vice versa.

Based on the IMPLAN model, regional employment under Alternative C for the modeled sectors would average approximately 3,617 jobs per year between 2008 and 2027 due to activities on BLM-administered lands and mineral estate. Table 4.49, “Average Annual Impacts on Employment, by Sector and Alternative for the Planning Area” (p. 1185) provides information on how these jobs break out by sector. Average annual earnings per job would be the same under Alternative C as Alternative A, and are described above.

Impacts to Tax Revenue

Projected tax revenues under Alternative C due to oil and gas production on federal surface would average $133.8 million per year for federal royalties, $64.2 million per year for state severance taxes, and $72.8 million per year for local ad valorem taxes. Because of limited data on specific locations of projected wells, there is not enough data to apportion the local tax receipts to individual communities. Table 4.50, “Estimated Oil and Gas Tax Revenues by Alternative for the Planning Area” (p. 1186) summarizes and compares tax revenues from oil and gas production under the alternatives. Alternative C would result in the greatest estimated oil and gas tax revenues compared to the other alternatives.

4.8.2.3.5. Alternative D

Impacts to Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative D for the modeled sectors (oil and gas, grazing, and recreation) would average approximately $185 million per year between 2008 and 2027, and regional output would average approximately $1,458 million per year due to activities on BLM-administered lands and mineral estate. The net present value of the stream of regional output, discounted at a 7 percent real discount rate (Office of Management and Budget 1992), would be approximately $14.3 billion over 20 years. Table 4.48, “Average Annual Impacts on Earnings and Output, by Sector and Alternative for the Planning Area” (p. 1184) summarizes and compares sector-level breakouts for earnings and output by alternative.

Alternative D excludes approximately 973,000 acres from renewable-energy development, and manages approximately 962,000 acres as avoidance areas for renewable energy. Approximately

460,000 acres will be open to renewable-energy development under Alternative D, a decrease of about 78 percent compared to Alternative A. The change in management would decrease uncertainty for firms considering developing renewable energy in the planning area compared to Alternative A, but it would also close substantial portions of the planning area to renewable-energy development. Therefore, the overall impact to economic activity related to renewable-energy development, compared to Alternative A, is uncertain. However, Alternative D would likely result in greater economic activity from renewable-energy development compared to Alternative B, and less compared to Alternative C. As noted in the discussion for Alternative A, transmission infrastructure is generally lacking; however, the market for wind energy is growing. However, due to the long time horizon associated with energy project planning and permitting, there would likely be no observable difference in economic impact due to renewable-energy development between alternatives for at least the first 5 to 10 years of the planning period.

Regarding economic activity associated with locatable mineral development and mineral materials disposals, the BLM generally expects to meet market demand and respond to applications and does not anticipate that the production of these minerals would vary across the alternatives. Alternative D increases the amount of land open to exploration and development of these minerals, as documented in the *Mineral Resources* section. However, this restriction would likely result in a minor impact to economic conditions compared to current conditions.

Impacts to Employment

Employment is a function of the level of economic activity (sales and purchases) among and between economic sectors. Thus, employment impacts are closely related to impacts on economic output. An increase in output implies an increase in employment, and vice versa.

Based on the IMPLAN model, regional employment under Alternative D for the modeled sectors will average approximately 3,424 jobs per year between 2008 and 2027 due to activities on BLM-administered lands and mineral estate. Table 4.48, “Average Annual Impacts on Earnings and Output, by Sector and Alternative for the Planning Area” (p. 1184) provides information on how these jobs break out by sector. Average annual earnings per job would be the same under Alternative D as Alternative A, and are described above.

Impacts to Tax Revenue

Projected tax revenues under Alternative D due to oil and gas production on federal surface would average $124.3 million per year for federal royalties, $59.6 million per year for state severance taxes, and $67.6 million per year for local ad valorem taxes. Because of limited data on specific locations of projected wells, there is not enough data to apportion the local tax receipts to individual communities. Table 4.50, “Estimated Oil and Gas Tax Revenues by Alternative for the Planning Area” (p. 1186) summarizes and compares tax revenues from oil and gas production under the alternatives. Alternative D would result in greater estimated oil and gas tax revenues than Alternative B, and slightly less than Alternative A or C.

4.8.3. Health and Safety

As addressed in this section, health and safety includes AMLs, coalbed fires, physical hazards, hazardous substances, and hydrogen sulfide gas.

The generation, use, disposal, or accidental release of hazardous substances are subject to the federal and state laws and regulations identified in Appendix A (p. 1343). In addition, Onshore Order #6 addresses requirements for operations in areas known or with the potential to produce hydrogen sulfide gas. These laws and regulations are designed to safeguard human health and safety and to protect the environment and would minimize the short- and long-term risks associated with hazardous substances and hydrogen sulfide gas.

4.8.3.1. Summary of Impacts

All alternatives would result in beneficial impacts to health and safety from management of AML sites and coalbed fires. Under all alternatives, the BLM and the Wyoming DEQ will identify and plan for remediation of AML and coalbed fire sites that would adversely impact health and safety. Primary impacts to health and safety from physical hazards would result from management that increases activities in areas with physical hazards and subsequently increases the risk and potential for accidents in these areas. Providing warning signs or other institutional controls, such as fencing, would result in similar impacts under all alternatives.

Under all alternatives, impacts from management of hazardous substances would be the same. The potential for impacts would vary by alternative based on the level of mineral activity. Alternative C, with the greatest amount of mineral activity, could increase the generation, use, transportation, and disposal of hazardous substances. To reduce adverse impacts to health and safety, authorized users would adhere to hazardous spill response plans, stipulations, and all applicable laws and regulations pertaining to hazardous substances. These requirements would provide a detailed strategy and process for responding to hazardous substance releases, therefore reducing the short-term impacts from contamination.

4.8.3.2. Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The BLM will set as its highest AML physical safety action priority cleanup of AML sites situated (1) where a death or injury has occurred and the site has not already been addressed, or (2) on or in the immediate vicinity of lands with high visitor use (BLM 2000). AML sites that adversely impact watersheds also will be a high priority. The BLM continues to support the Wyoming DEQ AML Division in reclaiming AML sites on public surface.
- AML sites, especially open shafts and adits, pose a danger to livestock and wildlife as well as humans. AML sites not reclaimed adversely impact recreational users.
- No assumptions were identified for physical hazards.
- All new hazardous materials and waste sites are identified and characterized.
- Resource development activities identify any possible generation of hazardous waste.
- No substantial new hazardous materials uses or waste generation will occur.
- The BLM Hazard Management and Resource Restoration Program responds to all hazardous material releases on public surface. Emergency cleanup actions are implemented on sites posing a substantial threat to the public and the environment.

4.8.3.3. Detailed Analysis of Alternatives

4.8.3.3.1. Impacts Common to All Alternatives

Abandoned Mine Lands and Coalbed Fires

To reduce the threat of physical and environmental impacts from AML sites and coalbed fires, the BLM will remediate sites based on risk.

Abandoned mines, especially shafts, pose safety hazards to livestock and wildlife as well as people. Long-term beneficial impacts to health and safety would result from the Wyoming DEQ AML Division continuing to work with the BLM to mitigate hazards associated with AML sites and coalbed fires.

Implementation of any of the alternatives would not be anticipated to result in additional AML sites or increase the risks at AML sites or coalbed fires that could adversely impact health and safety.

Physical Hazards

The BLM will manage physical hazards to reduce risks to the public by providing warnings and, where appropriate, developing mitigation measures to avoid and minimize impacts associated with physical hazards.

Implementation of any of the alternatives would not result in any increase in the potential for physical hazards; however, management could decrease the risks and potential impacts to health and safety resulting from physical hazards.

Hazardous Substances

Increases in human presence and activity associated with recreation, mineral activity, and ROW development increase risks associated with generation, use, transportation, and disposal of hazardous substances. Mineral activities are the most likely activities to increase the risk of hazardous substances to health and safety.

Impacts to health and safety from the management of hazardous substances would be the same under all alternatives because there are no separate management actions by alternative.

Implementing hazardous materials management activities will address human health and environmental risks from hazardous substances and hydrogen sulfide gas. Due to the increase in activity in oil and gas extraction, hydrogen sulfide poses an increasing threat to human health and safety. To reduce the risks to human health, all hydrogen sulfide plans will comply with Onshore Order #6, which identifies "uniform national requirements and minimum standards of performance expected from operators when conducting operations involving oil or gas that is known or could reasonably be expected to contain hydrogen sulfide." In addition, the BLM will mitigate safety concerns associated with hydrogen sulfide through signs, warning sirens, and public education. All of these management actions would reduce the potential for human health and safety risks from hydrogen sulfide. Any potential impacts to health and safety from hydrogen sulfide would increase in relation to the level of mineral activity that releases hydrogen sulfide.

The BLM manages hazardous materials to reduce risks to visitors, employees, and the environment; to restore contaminated land; and to perform emergency-response activities in accordance with appropriate laws, policies, and regulations. Management to reduce risk and contamination would reduce potential impacts to health and safety from hazardous substances. There could be substantive indirect impacts related to risks from hazardous substances during remediation.

Reporting spills and releases of chemicals, petroleum products, and produced water to the Wyoming DEQ would reduce the potential for short-term and long-term impacts to health and safety by controlling spills and facilitating an appropriate response to hazardous substance spills.

4.8.4. Environmental Justice

This section addresses the potential for the alternatives to result in disproportionate adverse impacts to minority and low-income populations, including direct, indirect, short-term, and long-term impacts. Appendix A (p. 1343) identifies the laws, regulations, policies, and guidance considered in the analysis of disproportionate adverse impacts.

Because the analysis of disproportionate adverse impacts depends on identified impacts related to resources and resource uses, definitions of adverse impacts as they apply to environmental justice issues are closely related to the definitions of adverse impacts for other resource areas (e.g., social resources). For example, the displacement of a mobile home park that houses a low-income population to build a new road could be a disproportionate direct impact. An example of a disproportionate indirect impact would be a reduction in social services to low-income individuals that could result from decreased tax revenues as a result of decreased mineral production.

4.8.4.1. Summary of Impacts

The alternatives would be identical regarding potential impacts to minority and low income populations. No particular BLM actions proposed under any of the alternatives would cause disproportionate adverse impacts to minority or low-income populations. The BLM has considered all input from persons regardless of their race, ethnicity, income status, or other social and economic characteristics.

4.8.4.2. Methods and Assumptions

Because the analysis of disproportionate adverse impacts is based on impacts to resources and resource uses, the assumptions for this analysis implicitly include the assumptions of other resource areas as they relate to the identification and analysis of impacts. In addition, this analysis assumes that the latest available demographic data from the U.S. Census Bureau and other sources accurately represent the population in the planning area.

In accordance with BLM and Council on Environmental Quality (CEQ) guidance for assessing environmental justice in the planning process, an area is considered to contain a minority population if either the minority population of the impacted area exceeds 50 percent or the percentage of minority population in the affected area is meaningfully greater than the percentage in the general population. The "general population" is defined as a relevant comparison area, such as the state.

In 2008, the minority population in the socioeconomic analysis area counties ranged from 5 percent (Hot Springs County) to 27 percent (Fremont County); the state average is 13 percent. On the WRIR, 33 percent of the population was minority. The vast majority of the population in the planning area reside in Fremont County. Within Fremont County, 18 percent of the population was in poverty in 2000 compared to 21 percent on the WRIR. In 2008, the Fremont County poverty level was 13 percent; no comparable data are available for the WRIR for 2008. The state poverty average is approximately 10 percent. Both in terms of minority populations and poverty, Fremont County and the WRIR are considered to have a relatively high concentration of minority population and low-income population, as defined in BLM and CEQ guidance, compared to the state.

4.8.4.3. Detailed Analysis of Alternatives

4.8.4.3.1. Impacts Common to All Alternatives

While there are minority and low-income populations in the planning area, no particular BLM actions under any of the alternatives have been identified as causing disproportionate adverse impacts to these populations. Although Fremont County has a high concentration of low-income and minority populations, there are no direct or indirect impacts under the alternatives that would affect these populations in a different way than the general population in the planning area. For example, the lower economic activity associated with Alternative B would cut across all sectors of the economy – from higher-skill managerial jobs to lower-skill service jobs. Therefore, there would be no identifiable environmental justice issues or direct or indirect impacts associated with any of the alternatives specific to any minority or low-income community or population as defined in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994) or BLM IM 2002-164 (*Guidance on Environmental Justice in Planning*).

Environmental justice principles also require that the BLM provide opportunities for people of all backgrounds to have a meaningful voice in the planning process. The BLM has provided numerous opportunities in a variety of formats, and has considered all input from persons regardless of their race, ethnicity, income status, or other social and economic characteristics.

4.8.5. Tribal Treaty Rights

The BLM has not identified any tribal treaty rights such as access to tribal hunting, fishing, or resource-collection areas that were reserved by treaties that could be impacted by RMP management decisions. Impacts to tribes are analyzed on a project-specific basis in consultation with the appropriate tribes. Any alternative that would impact wildlife, fish, or native plant communities in the planning area would have the potential to impact the treaty rights of a tribe. BLM guidance and statutory authorities protect sacred sites and other areas of importance to the tribes and are considered on a site-specific basis.

4.9. Climate Change

4.9.1. Summary of Impacts

GHG emissions from oil and gas development and production, vehicular traffic and authorized livestock grazing will be the greatest under alternatives A and C. Alternative B, followed by Alternative D, has the fewest adverse impacts because they authorize less of these activities that adversely impact the climate.

Alternative B, followed by Alternative D, has the most beneficial impacts because vegetation resources are more protected and wildlife protections are stronger to limit minerals development and long-term surface disturbance. Alternative D authorizes more livestock grazing AUMs (as well as more surface disturbance associated with range infrastructure) so it is less beneficial than Alternative B. Over time, the difference in AUMs as a measure of livestock emissions of methane may be substantially less beneficial. Alternatives A and C will have fewer beneficial impacts as a result of limitations on surface disturbance to protect wildlife. AUM levels are likely to be the highest under these two alternatives, although only moderately higher than under Alternative D with correspondingly higher methane emissions associated with livestock grazing.

4.9.2. Methods and Assumptions

A growing body of evidence indicates that Earth's atmosphere is warming. Records show that surface temperatures in the Wyoming region have risen approximately 1.5° Fahrenheit since the 1960 to 1979 baseline years (GCRP 2009b). The largest increase in average temperature has occurred in the winter months in the northern portions of the region. Relatively cold days in the region are becoming less frequent and relatively hot days are becoming more frequent (GCRP 2009b). Observed changes in oceans, ecosystems, and ice cover are consistent with this warming trend (National Academy of Sciences 2006).

Ongoing scientific research has identified the potential impacts of GHG emissions – including CO_2, CH_4, N_2O), water vapor and several trace gases – on global climate change. Through complex interactions at regional and global scales, these GHG emissions cause a net warming of the atmosphere (which makes surface temperatures suitable for life on Earth), primarily by decreasing the amount of heat energy Earth radiates back into space. Although GHG concentrations in the atmosphere and climatic conditions have varied throughout Earth's history, recent industrialization and burning of fossil fuels has caused global atmospheric CO_2 concentration to increase dramatically; this most recent CO_2 increase is likely to contribute to overall climatic changes (National Academy of Sciences 2006). Global atmospheric concentrations of CO_2, CH_4, and N_2O have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values (as determined from ice cores spanning many thousands of years).

The global increase in CO_2 concentrations is due primarily to fossil fuel use and land use change, while those of CH_4 and N_2O are due to agricultural soil management, animal manure management, sewage treatment, and mobile and stationary combustion of fossil fuels (IPCC 2007a, EPA 2009b). According to climate change researchers, the impacts of climate change are expected to vary by region, season, and time of day (National Academy of Sciences 2006, GCRP 2009b). Computer model forecasts indicate that increases in temperature will not be evenly or equally distributed, but are likely to be accentuated at higher latitudes. Warming during winter is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures (National Academy of Sciences 2006).

Within North America, the report specifically forecasts that: warming in western mountains is projected to cause decreased snowpack, more winter flooding and reduced summer flows, exacerbating competition for over-allocated water resources; in the early decades of the century, moderate climate change is projected to increase aggregate yields of rain-fed agriculture by 5 to 20 percent, but with important variability among regions; major challenges are projected for crops that are near the warm end of their suitable range or which depend on highly utilized water resources; cities that currently experience heat waves are expected to be further challenged by an increased number, intensity and duration of heat waves during the course of the century, with potential for adverse health impacts; and coastal communities and habitats will be increasingly stressed by climate change impacts interacting with development and pollution. Specific modeling and/or assessments of the potential impacts for the planning area and for the State of Wyoming currently do not exist.

The lack of scientific tools (models with sufficient spatial and temporal resolution) to forecast climate change even at regional scales limits the ability to quantify current and future impacts of climate change in the planning area. The following paragraphs describe potential future impacts of climate change that can be reasonably anticipated for the planning area; however, some of these impacts are known to already be occurring in the area. However, over the next 20 years, tools will become available that will allow for a better site-specific analysis of the impacts of a proposed activity on GHG and the site-specific impact from climate change. The U.S. Geological Survey (USGS), for example, is developing GIS based tools to determine the carbon storage of specific soils. Ongoing research is analyzing the response of different vegetation types to increasing CO_2, longer growing seasons, higher heat and more unpredictable rain patterns.

Increasing temperatures in the planning area are likely to contribute to increased evaporation, drought frequencies, and declining water quantity. The warming of lakes and rivers will adversely affect the thermal structure and water quality of hydrological systems, which will add additional stress to water resources in the region (IPCC 2007b). The planning area depends on temperature-sensitive springtime snowpack to meet demand for water from municipal, industrial, agricultural, recreational uses and BLM-authorized activities. The USGS notes that mountain ecosystems in the western United States are particularly sensitive to climate change, especially in the higher elevations, where much of the snowpack occurs, which have experienced three times the global average temperature increase over the past century (USGS 2010). Higher temperatures are causing more winter precipitation to fall as rain rather than snow, which contributes to earlier snowmelt. Additional declines in snowmelt associated with climate change are projected, which would reduce the amount of water available during summer (GCRP 2009b). Rapid spring snowmelt due to sudden and unseasonal temperature increases can also lead to greater erosive events and unstable soil conditions.

Within a given region, increasing temperatures could affect the amount of water vapor in the atmosphere, the timing and amount of precipitation, the intensity of storm systems, snow melt, and soil moisture. All of these factors can affect climate, day-to-day weather conditions, and air quality in the planning area. There is evidence that recent warming is impacting terrestrial and aquatic biological systems (IPCC 2007b). Warming temperatures are leading to earlier timing of spring events such as leaf-unfolding, bird migration, and egg-laying (IPCC 2007b). The range of many plant and animal species has shifted poleward and to higher elevation, as the climate of these species' traditional habitat changes. As future changes in climate are projected to be even greater than those in the recent past, there will likely be even larger range shifts in the coming decades (Lawler et al. 2009). Warming temperatures are also linked to earlier "greening" of vegetation in the spring and longer thermal growing seasons (IPCC 2007b). In aquatic habitats, increases in algal abundance in high-altitude lakes have been linked to warmer temperatures, while range changes and earlier fish migrations in rivers have also been observed (IPCC 2007b). Climate change is likely to combine with other human-induced stress to further increase the vulnerability of ecosystems to other pests, invasive species, and loss of native species. Climate change is likely to affect breeding patterns, water and food supply, and habitat availability to some degree. Sensitive species in the planning area, such as the sage-grouse, which are already stressed by declining habitat, increased development and other factors, could experience additional pressures as a result of climate change.

The observed change in glaciers in the Wind River Mountains identified in Chapter 3, indicates that these changes will influence land-management decisions in the planning area. These factors may change migration patterns of wildlife, appropriate seasons of use for livestock grazing, increase fire intensity and return interval and INNS spread. The susceptibility to cheatgrass in the southwest United States and the circular reinforcing relationship between cheatgrass infestation and landscape-level fires that has substantial contributed to greater sage-grouse reduction in numbers, was triggered in part by historic levels of high heat and drought. With climate fluctuations expected to see hotter and drier summers in the norther Rocky Mountains including the planning area with an increase in West Nile virus (which responds positively to that type of climate condition) this climate change could have very serious impacts to wildlife, particularly greater sage-grouse, forage availability, vegetation resources, and air quality (BLM 2009c).

Climate change also poses challenges for many resource uses on BLM-administered land. Increased temperatures, drought and evaporation may reduce seasonal water supplies for livestock and could impact forage availability. However, in non-drought years, longer growing seasons resulting from thermal increases may increase forage availability throughout the year. Shifts in wildlife habitat due to climate change may influence hunting and fishing activities, and early snowmelt may impact winter and water-based recreational activities. Drought and resulting stress on vegetation is likely to increase the frequency and intensity of mountain bark beetle and other insect infestations, which reduces the potential for sale of forest products on BLM-administered lands.

Increases in average summer temperatures and earlier spring snowmelt in the planning area are expected to increase the risk of wildfires by increasing summer moisture deficits (GCRP 2009b). Studies have shown that earlier snowmelts can lead to a longer dry season, which increases the incidence of landscape-level fire (Westerling et al. 2006). Together with historic changes in land use, climate change is anticipated to affect the variability in the occurrence of wildfire throughout the western United States. Although the impact of climatic factors varies by ecosystem type and from year to year, drought, low winter precipitation, wind conditions, and high summer temperatures are positively associated with wildfire occurrence (NPS 2010). During the last 20 years, research has shown that these factors have led to an increase in the frequency of very large wildfires and total acres burned throughout the Rocky Mountain region (NPS 2010). In response to drought and higher temperatures, the number of wildfires and total acres burned has generally increased within the planning area; see Figure 3.18, "Acres Burned and Number of Wildfires Per Year within the Lander Field Office, 1974-2008" (p. 316) in Chapter 3.

Climate change science and projections of climate change is a continually growing and emerging science. Additional and recent information on climate change and regional projections of climate change for the planning area can be found through the U.S. Global Change Research Program (http://www.globalchange.gov/) and the Intergovernmental Panel on Climate Change (http://www.ipcc.ch/).

Several federal initiatives have been launched to improve the ability to understand, predict, and adapt to the challenges of climate change. The Secretary of the Interior signed Secretarial Order 3289 on February 22, 2010, establishing a Department-wide, scientific-based approach to increase understanding of climate change and to coordinate an effective response to impacts on managed resources. The order reiterated the importance of analyzing potential climate change impacts when undertaking long-range planning issues, and also established several initiatives including the development of eight Regional Climate Science Centers. Regional Climate Science Centers would provide scientific information and tools that land and resource managers can apply to monitor and adapt to climate changes at regional and local scales (DOI 2010). The North Central Climate Science Center, which will incorporate the planning area, has a target establishment date of 2011.

Given the broad spatial influence of climate change which requires response at the landscape-level, the DOI also established Landscape Conservation Cooperatives which are management-science partnerships that help to inform management actions addressing climate change across landscapes. These Cooperatives are formed and directed by land, water, wildlife and cultural resource managers and interested public and private organizations, designed to increase the scope of climate change response beyond federal lands.

In addition to efforts being undertaken to better respond and adapt to climate change, other federal initiatives are being implemented to mitigate climate change. The Carbon Storage Project was implemented to develop carbon sequestration methodologies for geological (i.e., underground) and biological (e.g., forests and rangelands) carbon storage. The project is a collaboration of federal agency and external stakeholders to enhance carbon storage in geologic formations and in plants and soils in an environmentally responsible manner. The Carbon Footprint Project is a project to develop a unified GHG emission reduction program for the DOI, including setting a baseline and reduction goal for the Department's GHG emissions and energy use. More information about DOI's efforts to respond to climate change is available at: www.doi.gov/archive/climatechange/.

A variety of activities in the planning area currently generate GHGs. Fuels combustion, industrial processes and any number of other activities on public lands result in direct emissions of GHGs. Direct emissions in the planning area include those related to current and ongoing oil and gas and other minerals development, fire events, motorized vehicle use (e.g., OHVs), livestock grazing, facilities development, and other fugitive emissions. Indirect GHG emissions in the planning area include the demand for electricity generated outside the area. Contributions to climate change also result from land use changes (conversion of land to less reflective surfaces that absorb heat, such as concrete or pavement), and soil erosion (which can reduce snow's solar reflectivity and contribute to faster snowmelt). The emission of GHG by some BLM authorized activities are provided in the *Air Quality* section of this chapter.

4.9.3. Detailed Analysis of Alternatives

4.9.3.1. Impacts Common to All Alternatives

Soil resources and the vegetation it supports are major carbon sinks. See the *Soil* section. Removal of vegetation releases the soil organic carbon and the carbon stored in the vegetation, particularly the roots. Accordingly, the more surface disturbance and loss of vegetation, the more the activity contributes to GHG. This carbon is in addition to the emissions identified in the *Air Quality* section. The amount of carbon released varies depending upon the type of soil and vegetation and the vegetation that replaces it (growing trees, for example, are a greater carbon sink than grasses). The amount of surface disturbance varies by alternative (see the *Soil* section).

Vegetation resources are carbon sinks. The impacts to the type and health of the vegetation will directly impact the amount of carbon that is released into the atmosphere. The management of vegetation resources on BLM-administered lands varies by alternative. The more beneficial the impacts to vegetation resources, the more reduced the release of carbon, particularly where management focuses vegetation treatment on degraded areas with reforestation or revegetation of degraded areas.

Forests are important carbon sinks but as trees move from early to late seral stages, the overall carbon being removed from the atmosphere decreases and mature trees become a potential carbon liability if the carbon is released to the atmosphere by decay or fire. Analyzing this impact is extremely complex and depends in no small part on the use of harvested trees. Since timber harvesting does not vary meaningfully by alternative (although forest management does), the impacts of forest management on climate change is not further analyzed. The impacts of climate change to forest resources in the planning area are identified in Chapter 3.

All alternatives authorize livestock grazing on almost all of the planning area (there is less than 1 percent difference in areas closed to livestock grazing). However, livestock grazing management varies by alternative both in terms of the type of management systems to be utilized and, over time, the number of AUMs (Appendix L (p. 1477)). Improper livestock grazing management has the potential to adversely impacts soils and vegetation and lead to increased INNS, all of which would increase the release of carbon from soil and vegetation. See the *Soil* section. Cattle themselves are emitters of GHG in the form of methane (which is more powerful at warming the atmosphere than carbon dioxide) and there would be more than a moderate difference in the methane emitted by alternative, as the AUM reductions from the baseline (280,813 AUMs) were implemented. However, an analysis of the methane emitted by livestock grazing can be done, if at all, on an allotment specific basis. The amount of methane emitted depends on diet, supplementation, and other factors not part of BLM management. Livestock grazing strategies can improve forage so as to reduce methane production as well as reduce adverse impacts to soils and vegetation. Over time, technological changes may occur that change the amount of uncaptured methane from livestock. The United States government is working with operators of confined animal field lots to provide anaerobic digestors that will capture the methane and use it for energy production. The limits on technical modeling and the need for site-specific information result in climate change analysis of livestock grazing being limited to the impacts to soil and vegetation from the management.

ROWs such as wind-energy development have the potential to impact climate change, either beneficially, by reducing the burning of carbon based fuels to generate electricity, or adversely, by increasing surface disturbance in locations far removed from the ultimate users of the electricity. The alternatives vary in the amount of industrial wind energy that is likely to be authorized. However, the impacts on climate change of these actions cannot be determined without more site and project specific information. For example, if the generated electricity is utilized locally and replaces coal generated electricity, the beneficial impacts are far greater than if the power is generated and transported across hundreds of miles of new transmission lines and replaces electricity generated through the burning of methane in a cogenerated facility that captures the heat from the burning of the methane. Recognizing that the end use of the energy is too speculative for analysis, the BLM did not analyze the downstream impacts of wind-generated energy, and did not attempt to measure the net benefits of using a lower carbon fuel to generate electricity.

4.9.3.2. Alternative A

4.9.3.2.1. Program Management

Management under Alternative A protects soils and vegetation to a moderate degree and is anticipated to have the highest AUMs with the most livestock on BLM-administered lands.

4.9.3.2.2. Resources

The management described in the respective section (see the *Air Quality*, *Soil*, and *Vegetation* sections) addresses the management actions that adversely or beneficially impacts air, soils, and vegetation. That analysis reflects the extent to which Alternative A beneficially or adversely impacts climate change by contributing to a release of carbon from the soil and vegetation or atmospheric carbon sequestration.

4.9.3.2.3. Resource Uses

The emissions associated with BLM authorized activities are analyzed in the *Air Quality* section, including the increase in fugitive dust which adversely impacts vegetation, and reduces albedo, or reflectivity, of snow and glaciers. These impacts are all contributors to climate change. Reclamation of initial disturbance will stop carbon loss associated with vegetation removal but not recapture any of the carbon released to the atmosphere. Livestock grazing under Alternative A will have the most surface disturbance associated with range improvement projects with adverse impacts to soils and vegetation. By authorizing AUMs up to the total permitted use, Alternative A will result in the most methane gas emitted by livestock as well as all GHG emissions by vehicular use associated with large numbers of AUMs.

4.9.3.2.4. Special Designations

The impacts to air quality, soils, and vegetation by special designation management will have the same adverse or beneficial impacts to climate change. Management that protects vegetation in ACECs and that limits surface disturbance in the ACECs where setting is important will have a reduced adverse impact by reducing surface disturbance. However, GHG emissions may incrementally increase, if tourism and recreation increase, from travel-related emissions. The impacts of Alternative A in that regard are thought to be moderate.

4.9.3.3. Alternative B

4.9.3.3.1. Program Management

Alternative B manages with an emphasis on resource protections and a limit on surface disturbance. Alternative B management will likely limit wind-energy development. Alternative B over time will authorize the fewest AUMs and the most vegetation treatments to improve vegetation condition.

4.9.3.3.2. Resources

The management described in the respective section (see the *Air Quality*, *Soil*, and *Vegetation* sections) addresses the management actions that adversely or beneficially impacts air, soils, and vegetation. That analysis reflects that Alternative B has more beneficial impacts on air, soils and vegetation in relation to Alternative B. Accordingly, Alternative B would have more beneficially impacts to climate change than Alternative A and fewer adverse impacts. This is particularly true because of limits on surface disturbance for the benefit of biological resources.

4.9.3.3.3. Resource Uses

Alternative B has fewer adverse impacts to climate change by having lower GHG emissions than Alternative A and less mineral related surface disturbance. Livestock grazing management under Alternative B would have both fewer adverse impacts from livestock grazing emission of methane but would also most beneficially impact climate change by emphasizing vegetation improvement projects instead of infrastructure-type projects. Emphasis on improving degraded rangeland yields beneficial impacts to climate change by increasing vegetation to improve carbon capture and stopping the loss of organic carbon from soil. Over time, AUM use would be reduced as livestock grazing management would need to reduce numbers and seasons of use to meet rangeland objectives without the use of infrastructure. Vegetation utilization under Alternative B is likely to have more beneficial impacts to the climate because the use is “light” with substantially less risk of removing past the point at which production is adversely impacted. Over time, these beneficial impacts could be substantial.

4.9.3.3.4. Special Designations

The beneficial impacts described in the Special Designations sections of soil, water, vegetation, and wildlife from will beneficially impact climate change in the same manner, which is at least substantially more beneficial than Alternative A. Limits on surface disturbance, roads, and mineral development for the protection of values of concern will beneficially impact the climate. Conversely, increase in recreation and heritage tourism because of special designation management will adversely impact climate change by increasing transportation related emissions. It is likely that tourism will increase under Alternative B; see the *Economic Conditions* section for a comparison of the anticipated increase in recreation among all of the alternatives.

4.9.3.4. Alternative C

4.9.3.4.1. Program Management

Alternative C is very similar to Alternative A in its management of air, soils, vegetation, minerals, and livestock grazing. Alternative C has an emphasis on resource use with a much reduced level of protection for biological resources.

4.9.3.4.2. Resources

Impacts to air, soil, and vegetation under Alternative C are found in the *Air Quality*, *Soil*, and *Vegetation* sections. The impacts are very similar to Alternative A and substantially more adverse than Alternative B. Accordingly, Alternative C would have similar adverse impacts to climate change as Alternative A and substantially more adverse than Alternative B.

4.9.3.4.3. Resource Uses

Alternative C resource use management is similar to Alternative A although somewhat less restrictive. Impacts on the climate from this management are very similar to those under Alternative A and substantially more adverse than under Alternative B. Impacts from livestock grazing to climate change would be more adverse than under Alternative B but less than under Alternative A because, over time, fewer AUMs would be authorized. Alternative C has fewer limits on ROWs and more surface disturbance associated with mineral and realty development. Alternative C, like Alternative A, would emphasize infrastructure rather than the vegetation treatments that result in beneficial impacts under Alternative B.

4.9.3.4.4. Special Designations

Special designation management under Alternative C (no ACECs and minimal protections of the NHT) would result in adverse impacts described in the *Special Designations* sections of each resource. These impacts would be somewhat more adverse than Alternative A and substantially more adverse than Alternative B. The same adverse impacts to air, soil, and vegetation caused by allowing surface disturbance would adversely impact the climate. It is likely that there will be little additional recreation-related emissions under Alternative C because the BLM will not improve existing recreational opportunities and affords historic settings less protections, particularly in comparison to Alternative B.

4.9.3.5. Alternative D

4.9.3.5.1. Program Management

Alternative D is similar in its protections of air, soil, and vegetation as Alternative B, but over a smaller area. Greater sage-grouse protections are very similar, although slightly less restrictive. Alternative D manages livestock grazing in a way that is more similar to Alternative C than to Alternative A or B but with more limits on livestock grazing.

4.9.3.5.2. Resources

Impacts from management of air, soil, and vegetation under Alternative D are analyzed in the *Air Quality*, *Soil*, and *Vegetation* sections. Impacts are less adverse than alternatives A and C but more adverse than Alternative B. The comparative impacts to climate would be the same.

4.9.3.5.3. Resource Uses

Alternative D's impacts from resource uses to air soil and vegetation are described in those sections with corresponding impacts to climate. Alternative D authorizes less surface disturbance than Alternative C and more than Alternative B. The impacts of oil and gas and other mineral developments are analyzed in the *Air Quality* section; Alternative D has fewer adverse impacts to the climate than alternatives A and C, but more than Alternative B.

Adverse impacts to the climate from livestock grazing under Alternative D are less than under Alternative C, particularly over time, but more than under Alternative B because more AUMs will be authorized with more range infrastructure. Like alternatives A and C, Alternative D has a higher utilization level with a greater risk of impairing the vegetation's ability to sequester carbon, an adverse impact to the climate. Alternative D management emphasizes infrastructure when tied to a Comprehensive Grazing Strategy. This is likely to lead to less infrastructure because of resource conflicts but probably not enough vegetation treatment to meaningfully increase carbon capture in degraded rangelands. Over time, Alternative D will have fewer AUMs than Alternative C, so less methane will be emitted by the livestock and in livestock related transportation.

4.9.3.5.4. Special Designations

Special designation management under Alternative D is similar to, but less beneficial than under Alternative B in terms of impacts to the climate. The difference is analyzed in more detail in the *Air Quality*, *Soil*, and *Vegetation* sections. While fewer limits on surface disturbance will occur than under Alternative B, the difference will be only moderate or less because of VRM associated with the special designations. Alternative D has substantially fewer adverse impacts to climate than Alternative A, and much fewer than Alternative C.

4.10. Cumulative Impacts

CEQ defines cumulative effects as:

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7).*

For the Lander RMP revision, each of the three components of this definition of cumulative effects is addressed as follows:

- *Incremental impacts of the RMP revision.* The incremental impacts of the action (i.e., the revision of the existing plan), are described for each resource in the preceding sections.
- *Impacts from all past and present actions.* The impacts from all past and present actions are captured in the baseline conditions presented in Chapter 3, Affected Environment. As discussed in that chapter, the description of the current affected environment reflects past and present actions.
- *Reasonably foreseeable future actions.* Other reasonably foreseeable future actions are identified in Appendix T (p. 1535).

The analysis of cumulative impacts serves to place the projected incremental impacts from the management alternatives in the context of past, present, and future impacts. This combination necessarily involves projections and limited analyses. Public documents prepared by federal, state, and local agencies are the primary sources of information regarding past, present, and future actions. Speculative projects are not included in the projections, but areas of high potential for development or resource use that are unconstrained by management actions are identified and potential impacts are assessed. Necessarily, some of these analyses results will be qualitative, while others can be quantified. Certain developments might be identified as too speculative for analysis, such as oil shale development in an area that is not actively leasing oil shale.

Analyses are limited because there is incomplete documentation of all past and present impacts on private and public lands, and limited knowledge of future development because of changing economic and technical conditions. Illustrative of this process is the expansion of oil and gas activities associated with CBNG development, or the impact to management considerations with the USFWS decision that listing the greater sage-grouse under the ESA is warranted but precluded.

Methods and Assumptions

It is neither practical nor required to exhaustively analyze all possible cumulative impacts to all resources and uses. Instead, the CEQ indicates the cumulative impact analysis should focus on meaningful impacts. Therefore, the analysis in this document focuses on past, present, and future actions anticipated to result in substantial impacts to historically important resources. This analysis is likely predictive of cumulative impacts to other resources not analyzed here. The resources to be analyzed were developed based on issues identified during public scoping and through the professional judgment of BLM specialists and Cooperating Agencies.

Particular attention was given to controversial issues or those with a substantial public interest and the uniqueness of resources affected. However, some issues that might be considered controversial or with a substantial public interest were not addressed because there are no environmentally meaningful differences among the alternatives.

Assumptions used in the calculation of impacts from non-BLM actions in the planning area include:

- Oil and gas activities are based on the Wyoming Reservoir Management Group’s Oil and Gas RFD for the Wyoming BLM field offices.
- For cumulative impacts associated with non-BLM activities other than oil and gas, there is no “standard” assumption that can be made by extrapolating impacts associated with BLM management. The land and mineral ownership patterns in the planning area do not support attributing the same trends observed or identified for federal lands on state and privately owned lands.
- Generally, the context and intensity of non-BLM activities are not anticipated to vary by alternative because these activities do not directly depend on BLM management actions and allowable uses set forth in the RMP alternatives. However, oil and gas and wind-energy development will likely depend upon BLM management.
- Cumulative impacts such as soil erosion, INNS spread, and habitat fragmentation are anticipated to be commensurate with the amount of surface disturbance projected in the planning area (Table 4.51, “Cumulative Surface Disturbance from BLM and Non-BLM Reasonable Foreseeable Actions” (p. 1204)).
- Actions by private persons and entities are captured in public documents prepared by federal, state, and local agencies.
- The assumptions for reclamation are that short-term disturbance will be reclaimed within 2 years. This level of reclamation is based on soil stability and does not suggest a return to predisturbance conditions. Habitat fragmentation will not be restored in this timeframe; indeed predisturbance vegetation and habitat condition might not return for decades past the end of the planning period.
- Additional assumptions are identified under each issue.

Table 4.51. Cumulative Surface Disturbance from BLM and Non-BLM Reasonable Foreseeable Actions

Action	Alternative A	Alternative B	Alternative C	Alternative D
Total acres short-term disturbance from BLM actions	52,591	74,689	160,065	53,894
Total acres reclaimed from BLM actions	40,152	67,186	99,433	42,441
Total acres long-term disturbance from BLM actions	12,439	7,503	60,632	11,453
Total acres short-term disturbance from non-BLM actions	Unknown	Unknown	Unknown	Unknown
Total acres reclaimed from non-BLM actions	Unknown	Unknown	Unknown	Unknown
Total acres long-term disturbance from non-BLM actions	Unknown	Unknown	Unknown	Unknown
Cumulative long-term acres from disturbance	Unknown	Unknown	Unknown	Unknown

Source: Appendix T (p. 1535)

BLM Bureau of Land Management

Site-specific actions that have already occurred (past) or are ongoing (present) are not considered in this cumulative impacts analysis because they are already captured in Chapter 3, Affected Environment. Only those reasonably foreseeable future actions are considered in this cumulative impacts analysis.

Quantifiable aspects of the analysis, including impacts to air quality and surface disturbance have been identified. It is important to note however, that the specificity of the numbers in the table suggests a degree of accuracy that the data do not support, particularly because historical trends are used to predict future activity. With the immediate impacts of fluctuation of commodity prices on development, historical trends might not be representative of the future. For example, historical trends in locatable mineral development include a 15-year period in which 8 years had prices of uranium averaging under $15.00 per pound and 1 year with prices close to $100 per pound. In addition, much of the BLM data were created before modern equipment made exact measurement possible. Historic surface disturbance is based on permitted activities rather than the as-built environment. Acknowledging the limitations of the data is not to undermine its utility for comparative analysis of alternatives, either for assessing cumulative impacts or for direct and indirect impacts. This is especially true for the RMP, which includes limited site-specific analysis.

The following issues have differing levels of analysis of non-BLM activities.Of these issues, the most detailed analysis is for greater sage-grouse because of the 2010 USFWS finding that listing under the ESA was warranted but precluded (USFWS 2010). Because the Cumulative Impact Assessment Area (CIAA) for the greater sage-grouse was determined to be the State of Wyoming, development across the state is identified. This analysis applies to the other issues, but is not repeated unless it is relevant on a site-specific basis. Therefore, the Core Area protection for greater sage-grouse will also protect riparian-wetland and vegetative resources in the Core Area. The reduced protections for non-Core Area will result in reduced benefits to riparian-wetland and vegetative resources. Consequently, although only the greater sage-grouse analysis discusses the different types of development in-depth, the adverse or beneficial cumulative impacts apply to the other resources.

Table 4.52, “Summary of Reasonably Foreseeable Future Actions” (p. 1206) identifies reasonably foreseeable future projects that are considered in this cumulative impacts analysis. The majority of the projects identified are programmatic and/or strategic in nature; therefore, the exact intensity or location of anticipated impacts cannot be quantified. Most projects identified in Table 4.52, “Summary of Reasonably Foreseeable Future Actions” (p. 1206) are ongoing and provide a management framework for site-specific actions implemented during the life of the various projects. Though they are considered in this cumulative impacts analysis, refer to Chapter 3 for a detailed description of site-specific past and present (i.e., ongoing) actions.

Table 4.52. Summary of Reasonably Foreseeable Future Actions

Resource Plans	**Physical Resources**	Air Quality	Geologic Resources	Soil	Water	Cave and Karst Resources	Non-WSA Lands	**Mineral Resources**	**Fire and Fuels Management**	**Biological Resources**	**Heritage and Visual Resources**	Cultural Resources	Paleontological Resources	Visual Resources	**Land Resources**	Lands and Realty	Renewable Energy	Rights-of-Way and Corridors	Trails and Travel Management	Livestock Grazing Management	Recreation	**Special Designations**	Congressionally Designated Trails	Wilderness Study Areas	Wild and Scenic Rivers	ACECs	**Socioeconomic Resources**	Social Conditions	Economic Conditions	Health and Safety	Environmental Justice	Tribal Treaty Rights
BLM RESOURCE MANAGEMENTS PLANS AND OTHER FEDERAL PLANS AND ANALYSES																																
Draft Resource Management Plan and EIS for the Bighorn Basin Planning Area (2011)		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X		X	X	X	X	X
Approved Resource Management Plan and Final EIS for the Casper Field Office Planning Area (2007)		X	X	X	X			X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X		X	X	X	X	X
Green River Resource Management Plan and Final EIS for the Rock Springs Field Office (1997)		X	X	X	X			X	X	X	X	X	X	X		X		X	X	X	X		X	X	X	X		X	X	X	X	
Approved Resource Management Plan and Final EIS for the Rawlins Field Office (2008)		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X		X	X	X	X	
Approved Resource Management Plan and Final EIS for the Pinedale Field Office (2008)		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X		X	X	X	X	
Final Programmatic EIS, Wind Energy Development on BLM-Administered Lands in the Western United States (2005)					X												X	X												X		
Final Programmatic EIS, Designation of Energy Corridors on Federal Land in the 11 Western States (2008)					X											X	X	X											X			
Final Programmatic EIS, Geothermal Leasing in the Western United States (2008)					X			X								X	X												X			
COUNTY PLANS																																
Carbon County Land Use Plan		X	X	X	X			X		X				X		X		X										X	X			
Fremont County Land Use Plan		X			X			X		X		X	X	X						X			X			X				X		
Hot Springs County Land Use Plan		X			X			X		X		X	X	X						X			X			X			X	X		
Natrona County Land Use Plan				X	X			X	X	X		X		X		X		X		X	X								X			
Sweetwater County Land Use Plan		X			X			X		X						X			X	X	X								X			
CONSERVATION DISTRICTS																																
Popo Agie CD Long Range Plan (2008-2012)				X	X					X						X					X								X	X		
Dubois–Crowheart CD Land Use and Resource Management Plan (2006-2010)		X	X	X	X				X		X							X		X	X				X				X			
Lower Wind River CD Long Range Plan (2011-2015)			X	X	X			X		X						X				X									X	X		
WATERSHED PLANS																																
Popo Agie CD Watershed Plan					X				X	X									X	X					X					X	X	

Resource Plans	**Physical Resources**	Air Quality	Geologic Resources	Soil	Water	Cave and Karst Resources	Non-WSA Lands	**Mineral Resources**	**Fire and Fuels Management**	**Biological Resources**	**Heritage and Visual Resources**	Cultural Resources	Paleontological Resources	Visual Resources	**Land Resources**	Lands and Realty	Renewable Energy	Rights-of-Way and Corridors	Trails and Travel Management	Livestock Grazing Management	Recreation	**Special Designations**	Congressionally Designated Trails	Wilderness Study Areas	Wild and Scenic Rivers	ACECs	**Socioeconomic Resources**	Social Conditions	Economic Conditions	Health and Safety	Environmental Justice	Tribal Treaty Rights
WATERSHED PLANS																																
Popo Agie CD Watershed Plan					X				X	X									X	X										X		
Ocean Lake Watershed Water Quality Management Plan (Lower Wind River CD)					X			X		X										X										X		
Belle Fourche River Watershed Plan (Sweetwater CD)					X																											
Watershed Strategic Plan (Wyoming Assoc. of Conservation Districts)				X	X					X									X	X								X	X	X		
STATE AGENCY PLANS																																
Wyoming Dept of Agriculture Strategic Plan (2005)																																
Wyoming Game and Fish Strategic Habitat Plan										X										X												
Wyoming Game and Fish Greater Sage-Grouse Conservation Plan				X	X			X		X										X												
Wyoming Game and Fish Final Wyoming Gray Wolf Management Plan (2007)										X																						
Wyoming State Water Plan Wind/Bighorn River Basin (2003)					X							X					X			X												X
Wyoming Statewide Comprehensive Outdoor Recreation Plan (2003)																			X	X												
Wyoming Statewide Trails Plan (2004)																			X	X					X							
Wyoming SHPO Comprehensive Statewide Historic Preservation Plan (2007-2015)												X		X																		
FEDERAL AGENCY PLANS																																
Shoshone National Forest Land and Resource Management Plan		X		X	X			X	X	X										X	X					X		X	X			
United States Fish and Wildlife Pathfinder Interim Management Plan					X					X																						
United States EPA Region 8 Wyoming State Implementation Plans		X												X																		
FIRE MANAGEMENT PLANS																																
Yellowstone National Park Fire Management Plan		X							X	X		X																				
Southern Zone Fire Management Plan									X	X																						
Wyoming Fire Management Plan				X					X	X																						
Federal Wildland Fire Management Policy				X					X	X																						

4.10.1. Cumulative Impacts to Greater Sage-Grouse from Management Actions

Cumulative Impact Assessment Area

State of Wyoming

Background

Greater sage-grouse habitat is found throughout most of Wyoming. Approximately 69 percent of the state has been mapped as historic range for the species, with most of the range still identified as having suitable habitat. As part of the 12-month finding in response to petitions to list the greater sage-grouse under the ESA, the USFWS identified a list and ranking order of threats to greater sage-grouse populations and habitat across the species' range. The top five threats identified for the eastern part of the range, which encompasses Wyoming, are oil and gas development, infrastructure, INNS, wildfire, and livestock grazing (Diebert 2010). All of these primary threats occur on lands throughout the state regardless of ownership. As a federal agency, the BLM is obligated to develop and implement a strategy to avoid having its management activities contribute to the need to list greater sage-grouse under the ESA (BLM 2008e; BLM 2004a).

In 2008, the Governor of Wyoming issued an Executive Order establishing greater sage-grouse Core Area throughout the state, which was followed up in 2010 with a revised Executive Order (Map 63). The Executive Order resulted from work completed by the Governor's Sage-grouse Implementation Team (SGIT), which was formed to find ways to conserve greater sage-grouse in Wyoming in response to listing petitions. The SGIT developed a list of stipulations intended to maintain existing suitable greater sage-grouse habitat by allowing development activities to occur in Core Area in a way that will not cause a decline in the greater sage-grouse population. The Core Area strategy, which the BLM has adopted, is designed to protect approximately 83 percent of the statewide population within approximately 25 percent of the state's land mass. Greater sage-grouse conservation strategies also are being implemented outside Core Area, but to a lesser degree. In response to the Governor's request for review of the Core Area strategy, the USFWS stated that the strategy the SGIT outlined would be "a sound framework for a policy by which to conserve greater sage-grouse in Wyoming."

Through the issuance of IM WY-2010-012 (BLM 2009n), the Wyoming BLM has committed to the management outlined in the 2008 Executive Order and will utilize energy location densities and cumulative surface disturbance thresholds in Core Area to protect greater sage-grouse habitat over the long term (BLM 2009n). Because the Core Area strategy has recently been developed, there are no BLM land use plans in Wyoming that have formally adopted the Core Area strategy. Accordingly, greater sage-grouse conservation is implemented on a case-by-case basis in individual, site-specific NEPA analyses. BLM field offices are in the process of revising or amending RMPs to incorporate the Core Area strategy, which is reflected in Alternative D of this RMP and EIS.

Analysis of Cumulative Impacts

The State of Wyoming was selected for analysis because the approach identified for conservation of the species is a statewide plan. Greater sage-grouse numbers will be evaluated by the USFWS for the state as a whole. Consequently, BLM management of public lands in the planning area will be evaluated not in terms of the number of greater sage-grouse thought to occur locally, but as a component of the statewide numbers.

Assumptions

This analysis examines current and future actions occurring on non-BLM-administered lands in the planning area and actions occurring on all lands outside the planning area (including BLM-administered lands in other field office planning areas) that can affect greater sage-grouse and their habitats. The following assumptions are made:

- The Core Area strategy and management stipulations will be successful at protecting approximately 83 percent of the greater sage-grouse population in Wyoming, which will be sufficient to prevent listing the greater sage-grouse under the ESA.
- Statewide, the BLM will implement the Core Area-based management through new RMPs or amendments to existing RMPs. While NEPA analysis has not been completed for Core Area prescriptions, the work of the SGIT strongly supports the likelihood that Core Area management will be identified as the best method of protecting greater sage-grouse with the fewest adverse impacts to other uses and resources. While it is possible that in certain areas a different strategy will be found appropriate or selected through NEPA analysis (including more stringent prescriptions on development), analysis here assumes that the Core Area strategy will be implemented including management for the non-Core Area.
- Future Governors of Wyoming will comply with Executive Order 2010-4 and State of Wyoming lands will continue to be managed in accordance with the Executive Order.
- Locatable mineral mining, primarily for uranium and bentonite, will not be subject to disturbance densities outlined in the Executive Order or the IM; however, disturbance from these activities will be used in disturbance calculations for other projects.
- WRIR and the USFS have committed to the Core Area strategy, and lands in and out of the Core Area will be managed in compliance with the management stipulations applicable for each area.
- Non-Core Area greater sage-grouse populations will likely decline due to loss and fragmentation of habitats.
- Private lands with high potential for oil and gas and wind-energy development are likely to be developed with no specific emphasis on protecting greater sage-grouse habitat.
- Development in non-Core Area that pushes activities near the edge of the Core Area is likely to adversely impact the functionality of the adjacent Core Area habitat. Surface disturbance and human activity near this edge could cause degradation of adjacent Core Area habitat and result in Core Area boundaries to erode over time.

Cumulative impacts to greater sage-grouse will occur primarily from surface-disturbing and other disruptive activities across Wyoming that result in the loss, degradation, or fragmentation of habitat or key habitat components, the disturbance/displacement of birds during sensitive periods, and direct mortality. Impacts to greater sage-grouse from non-BLM actions in the planning area and from all actions in the remainder of the state are primarily anticipated from the same threats the USFWS identified for the eastern part of greater sage-grouse range. These threats occurring in the CIAA are discussed below. Management that results in beneficial and adverse impacts will vary by land ownership and whether the project is in Core Area or non-Core Area. Table 4.53, “Percent Composition by Land Ownership of Greater Sage-Grouse Core Area and Non-Core Area” (p. 1210) lists the percentage of land ownership in the planning area and the CIAA.

Table 4.53. Percent Composition by Land Ownership of Greater Sage-Grouse Core Area and Non-Core Area

	Total	Bureau of Land Management	State of Wyoming	Private	Forest Service	Wind River Indian Reservation	Other
Planning Area	100	36.9	4.3	18.9	13.5	23.8	2.6
Core Area in Planning Area	40.2	64.3	6.5	17.6	0.02	11.2	0.4
Non-Core Area in Planning Area	59.8	18.5	2.8	19.7	22.6	32.3	4.1
State of Wyoming Overall Ownership	100	27.9	5.8	44	13.8	2.5	5.9
Ownership of the 24.4 Percent of Wyoming Lands in Core Area	-	50.8	7.2	36.6	0.2	1.9	3.2
Ownership of the 75.6 percent of Wyoming Lands that are Non-Core Area	-	20.6	5.3	46.5	18.1	2.6	6.8
Source: BLM 2009a							

“Other” lands are primarily under the jurisdiction of the Bureau of Reclamation, U.S. Department of Defense, and the USFWS and support very limited amounts of habitat for greater sage-grouse. Because of the small percentage of the state comprising other lands, they are not further discussed.

Private lands are not subject to Core Area or non-Core Area stipulations and it is likely that protective measures for greater sage-grouse would not be implemented on private lands unless the private landowner voluntarily agrees to protective measures or enters into a Candidate Conservation Agreement with Assurances. Most contiguous private land is in the eastern third of the state, and some of these lands do not contain sagebrush habitats or have been converted through agricultural practices; therefore, they do not support greater sage-grouse. On a statewide basis, more acres are in private ownership than the total acres of lands, outside the national parks, managed by federal agencies including BLM and USFS. Accordingly, management of private lands has a very real potential to impact greater sage-grouse. Although only 17.6 percent of the Core Area is privately owned, activities on private lands surrounding the Core Area could result in adverse impacts to the private land in the Core Area, particularly from energy development, infrastructure, livestock grazing, and subdivisions not covered by the State of Wyoming or federal Core Area strategies.

The western two-thirds of the state has more BLM-administered, WRIR, and USFS lands. As indicated in the assumptions for analysis, BLM, USFS, WRIR, and state lands will be managed in accordance with the stipulations identified for both the Core Area and non-Core Area. Greater sage-grouse are not known to occupy USFS lands except in a portion of the Thunder Basin National Grasslands, which is why, although 13.8 percent of Wyoming lands are USFS lands, the USFS manages only 0.2 percent of the Core Area. Nevertheless, USFS management is consistent with the Core Area strategy.

In the Core Area, stipulations on BLM, State of Wyoming, WRIR, and USFS lands will limit the number of projects and amount of surface disturbance allowed per square mile for discretionary actions. Although the details of management are likely to vary under each jurisdictional boundary, in general, the plans will not authorize surface disturbance within a 0.6-mile buffer around active greater sage-grouse leks. In addition, a seasonal protection stipulation will be applied to surface-disturbing and disruptive activities in suitable sage-grouse habitat during the breeding/nesting period, generally mid March through the end of June. These limitations should provide adequate protection to maintain habitat to support the current number of greater sage-grouse found within the Core Area boundaries. However, see below for a discussion of the issues associated with locatable minerals.

Approximately 75 percent of the state is identified as non-Core Area, which supports just 17 percent of the known greater sage-grouse population. Non-Core Area is comprised of lands that historically did not support greater sage-grouse, have isolated or very small scattered leks, or are undergoing or are planned to undergo intensive development and/or urbanization.

Non-Core Area protections are much less restrictive (i.e., a ¼-mile buffer around leks versus the 0.6-mile buffer in Core Area). Therefore, it is likely that additional greater sage-grouse habitat loss and fragmentation will occur on BLM, State of Wyoming, WRIR, and USFS lands in areas undergoing development activities. In addition to the smaller lek and nesting buffers, there are no limits on the number of projects or the amount of surface disturbance that can occur in non-Core Area. It is expected that habitat losses in non-Core Area will accrue regardless of land ownership and will increase as disturbance caps are reached in the Core Area. It is not possible to quantify this effect as the Core Area strategy provides an incentive for successful reclamation of disturbance so as to reduce the area considered disturbed.

In summary, the most beneficial impacts to greater sage-grouse are in Core Area, which have most of the land managed by agencies using Core Area stipulations (i.e., the BLM, the State of Wyoming, the WRIR, and the USFS). The most adverse situation for greater sage-grouse is to be in the non-Core Area or in the Core Area with substantial private land not subject to the stipulations. Not coincidentally, the most concentrated areas of Core Area are in the parts of Wyoming with the most concentrated federal lands. Map 136 shows land ownership across the state and identifies the greater sage-grouse Core Area.

Stipulations for Core Area and non-Core Area will apply primarily to oil and gas and energy-related realty actions, but could pertain to range improvement projects (e.g., vegetation treatments, water developments, fences) depending on the size and scope of the project. Surface disturbance related to locatable mineral mining, primarily for uranium and bentonite, and non oil and gas mineral leasables will not be subject to the same stipulations; however, disturbance from all activities will be used in calculations when assessing whether disturbance caps have been reached.

Excluding high development or high mineral potential areas from the Core Area is a recognition that highly disturbed areas are generally not suitable as greater sage-grouse habitat. However, many of these areas were suitable habitat before disturbance, and therefore can be found directly adjacent to the Core Area. Because most of the heavily developed areas are non-Core Area, less restrictive stipulations apply. Therefore, it is likely that the intense development could have a spill-over effect to the Core Area, with potential erosion of habitat adjacent to development. This potential is discussed below for each type of development.

The BLM applies Core Area stipulations only to federal surface, not to federal minerals for split-estate. While this has little impact in the planning area because of the limited amount of split-estate in Core Area (417,287 acres, generally in the eastern portion of the planning area), on a statewide basis there are extensive private surface lands with federal minerals in the Core Area; see Map 137. In the Buffalo and Newcastle planning areas for example, almost all mineral ownership in the Core Area is either private or split-estate where the Core Area stipulations will not be applied. Similarly, in the Pinedale planning area, some of the Core Area is bisected by private surface. As discussed below, the Core Area is vulnerable to impacts from adjacent oil or gas development.

The greatest contributor to the decline in greater sage-grouse populations is habitat fragmentation. Small decreases in lek connectivity result in large increases in probability of lek abandonment (Connelly et al. 2000) The greater the extent to which habitat is fragmented and connectivity lost, the greater the adverse impacts to sage-grouse.

Oil and Gas

Currently, oil and gas exploration and development is taking place throughout much of the state, with the most intensive development in the Powder River Basin, Pinedale, and Red Desert areas. The Powder River Basin area has less Core Area and a higher percentage of private land, whereas the Pinedale and Red Desert areas have more Core Area and a higher percentage of BLM-administered lands. In the case of the Powder River Basin, most greater sage-grouse habitat occurs in non-Core Area and therefore will likely receive relatively limited protection due to the large amount of private land and the high value of oil and gas production. On the limited amount of federal lands where stipulations apply, greater sage-grouse will receive the lower level of protection applied to non-Core Area, which will likely lead to substantial adverse impacts to greater sage-grouse because only ¼ mile around leks will be closed to surface disturbance.

Oil and gas development across the state is expected to remain stable or increase over the next 20 years with the majority of activity currently occurring, or predicted to occur, in areas open to leasing having very high, high, and moderate potential for future development of oil or gas reserves. As technology increases and new reserves are discovered, development will occur both inside and outside the Core Area. For example, the BLM recently authorized increased development in the Salt Creek Field in Casper utilizing CO_2 enhanced recovery (BLM 2007e) which is a technology being used in old oil fields.

As surface disturbance caps are reached in the Core Area, it is expected that development in non-Core Area will increase, at least until reclamation levels are achieved in Core Area and new surface disturbance is possible. While reclamation and mitigation measures will reduce short-term impacts from surface disturbance, permanent facilities such as roads, well pads, and powerlines will result in long-term disturbance. Development on BLM, State of Wyoming, WRIR, and USFS lands in Core Area (approximately 50 percent of the total acres of statewide Core Area) will be subject to the management stipulations outlined in the Core Area strategy; therefore limits will be placed on the amount of habitat loss and fragmentation that can occur. The Core Area strategy should prevent large losses of habitat except in areas currently leased and unitized that are undergoing substantial development, such as in the Rawlins and Pinedale planning areas. In this situation, it will be difficult to keep the total surface disturbance under the 5 percent threshold identified in the Executive Order and IM. Development on private lands (approximately 37 percent of total statewide Core Area) will not be subject to the same stipulations, and habitat loss and fragmentation will likely increase as opportunities for development on BLM and State of Wyoming lands become more limited. An unintended consequence of federal limitations could be to push more development onto private lands.

Oil and gas exploration and development on BLM, State of Wyoming, WRIR, and USFS lands in non-Core Area will not be subject to the location density and total disturbance caps. Areas currently undergoing intensive development in the state are primarily outside the Core Area, and it is anticipated that the high level of development will continue in existing fields. Increased levels of noise and human activity, combined with smaller lek buffers and increased habitat fragmentation from surface disturbance, will likely render these areas avoided or unusable by greater sage-grouse.

Erosion of the Core Area edges could occur where Core Area adjoins or includes existing or anticipated oil and gas operations, such as south of Highland in the Casper planning area, the Wamsutter/Creston Junction area of the Rawlins planning area, the Hiawatha area, and the Wyoming Range. At particular risk is the Core Area separated by the Pinedale Anticline, which will experience intensive oil and gas development and associated infrastructure during the next 15 years (approximately 4,400 new wells) with a 40-year productive life (BLM 2008f). The Core Area in the northern portion of the Wyoming Range could be subject to pressure from oil and gas reserves with high potential for development northwest of Cora. There also is high potential for development south of Pinedale and east of Big Piney that is adjacent to Core Area. The Jonah Field is partially in the Core Area, as is the Hiawatha and Wamsutter/Creston Junction developments. The BLM is completing an EIS for an additional 1,600 wells in the Moxa Arch project, which will be an addition to the approximately 1,450 wells already developed. A small portion of the project area lies within the Core Area and the rest of the project area falls in non-Core Area adjacent to the Core Area.

In addition to the disturbance associated with actual oil and gas operations, infrastructure requirements increase substantially. For example, the Pinedale Field Office recently approved an ROW for 55 miles of 230-kilovolt transmission line and two substations to support oil and gas activities in the Pinedale Anticline (BLM 2009o). While some of the surface disturbance associated with oil and gas development are included in the oil and gas RFDs, additional disturbances such as new transmission lines could be necessary to fully develop and transport these resources.

Non-Oil and Gas Leasable Minerals

Coal resources tend to be present in localized regions in Wyoming. Major coal resources are present outside the planning area near Gillette/Wright, Hanna, and east of Rock Springs. As with high-potential oil and gas areas, places with high potential for coal have primarily been omitted from the Core Area. However, coal leases are currently in place close to the Core Area in the Buffalo and Newcastle planning areas and south of the Core Area to the northwest of Rock Springs. The coal leases near Hanna in the Rawlins planning area are in the Core Area but the IM regarding caps on surface disturbance do not apply to coal leasing. (It is not known at this time how the Rawlins RMP will be amended regarding greater sage-grouse management, and whether the IM will be followed or a more restrictive management applied that includes limitations associated with surface disturbance from coal mining.) Coal development areas must be fully reclaimed following mining extraction, but the intensive nature of the development activity over a considerable period results in a long-term impact and would likely result in adverse impacts to adjacent and nearby Core Area habitats.

Phosphate is a leasable mineral that could adversely impact greater sage-grouse habitats in Wyoming. While phosphate resources occur throughout the State of Wyoming, generally, they are not present in commercially viable quantities. Currently, there is no phosphate leasing or production from federal surface or mineral estate in the CIAA (BLM 2010g). In the case of the planning area, phosphate potential has been identified, but leases have not been reviewed pending the revised RMP decisions. Future demand for phosphate minerals will likely increase over time in other parts of Wyoming; however, this development is too speculative to consider as a cumulative impact. Under the Executive Order and IM, phosphate leasing, a BLM discretionary activity, is subject to the surface disturbance limitations in the Core Area discussed above for oil and gas.

Trona is another leasable mineral present in the CIAA. While not present in the planning area, it is present in the southwest part of the state, principally overlapping the Kemmerer and Rock Springs planning areas, with an additional small location inside Core Area near Rock Springs. Historic mining activity and infrastructure has affected the availability of suitable greater sage-grouse habitat, so extensive resources are in non-Core Area. An additional area of trona is identified as occurring in “islands” of disconnected Core Area. The IM does not apply to trona development, so it is possible that additional mining could adversely impact or erode the surrounding Core Area. The sections of Core Area with trona resources comprises a small part of the state’s overall Core Area; because trona resources are so concentrated within a portion of the southwest part of the state, mining is not likely to impact the remaining Core Area.

Locatable Minerals

The BLM grants locatable mineral authorizations under the 1872 General Mining Law unless unnecessary or undue degradation would result. So long as the greater sage-grouse is a candidate species and not listed under the ESA, locatable mineral development such as uranium and bentonite mines, will be authorized where they would not cause unnecessary or undue degradation to the greater sage-grouse or their habitat. As a consequence, the Core Area strategy has little application except to the extent that the strategy is designed to avoid listing greater sage-grouse, which would trigger more stringent management of locatable minerals. Locatable mineral activity is subject to regulation by the Land Quality Division of the Wyoming DEQ. Wyoming has added stipulations for mining activities that could limit locatable mineral mining in Core Area, but the impact of these stipulations is not clear because there is no history to suggest how stipulations would be applied when the State of Wyoming processes an application in Core Area. If the State of Wyoming limits surface disturbance, it is likely that mines would be precluded because surface disturbance created from mining activities would meet or exceed the disturbance threshold of 5 percent.

Major uranium resources in the planning area are found in the Gas Hills and Green Mountain areas, and outside the planning area near Midwest and directly south of the planning area boundary in the Great Divide Basin. Generally, these areas are in non-Core Area, reflecting the decades of mining and AML reclamation that has resulted in habitats unsuitable for greater sage-grouse. The Green Mountain area and the uranium deposits near the southern boundary of the planning area are in Core Area. Just as in the case of oil and gas, there is extensive uranium potential close to Core Area, which presents the potential of eroding the outer boundaries of the Core Area. This is particularly true in the Casper, Buffalo, and Rawlins, planning areas where existing claims and identified projects are in or adjacent to the Core Area. The Lander Field

Office is processing an EIS for a uranium mine adjacent to the Core Area that overlaps the Casper planning area, and the Rawlins Field Office is processing a uranium mine application along its boundary with the Lander planning area. In addition to the three uranium recovery facilities in the planning area, the U.S. Nuclear Regulatory Commission is processing 11 active license applications and two inactive applications in Wyoming (Nuclear Regulatory Commission 2010). If these proposed mines are in or near the Core Area, they would adversely impact to greater sage-grouse habitat and could cause erosion of Core Area boundaries.

Wyoming has extensive bentonite resources, some of which overlap or are adjacent to the Core Area. The loss of sagebrush habitat associated with bentonite in the Bighorn Basin has been intensive on a local scale and contributed to altering 12 percent of the sagebrush habitat in the Bighorn Basin (BLM 2009c). Restoration efforts to return the mine site to predisturbance vegetative conditions have been mostly unsuccessful. The BLM anticipates an additional 34 square miles to be disturbed by bentonite mining through 2024 in addition to other oil and gas and energy transmission disturbances (BLM 2009c).

Bentonite resources in the planning area are located in the Core Area, except for an operating bentonite mine in the Gas Hills area that is just outside the Core Area. Active bentonite mines do not support suitable greater sage-grouse habitat; therefore, mines in the CIAA, specifically in the Worland and Cody planning areas, are in non-Core Area. However, in those two planning areas, almost all of the bentonite claims are adjacent to Core Area, which could increase the potential to impact Core Area habitat and erode the Core Area edges to the east of these mines. In the Casper and Buffalo planning areas, most of the bentonite claims are adjacent to or within the Core Area. Just as with uranium, it is not clear the extent to which the State of Wyoming greater sage-grouse protections will limit mines in Core Area, but the 1872 General Mining Law and subsequent BLM management will not limit the development of bentonite resources unless unnecessary or undue degradation would result.

Mineral Material Disposals

Mineral material disposals, often referred to as “salable minerals,” are a BLM discretionary action. Mineral material sources are available throughout the state and can occur on all ownership lands. It is expected that mineral material disposals in suitable habitat on lands managed by the BLM, State of Wyoming, the WRIR, and the USFS would likely not be allowed in new areas within or adjacent to suitable greater sage-grouse habitat in Core Area even if not specifically closed by the agency's management plan. On privately owned mineral estate, disposals could occur in the Core Area and demand for private sites could increase if federal and state lands are closed to disposals. While some mineral material disposals are subject to the State of Wyoming Land Quality Department permitting process, smaller disposals from community pits and common use areas are not, and the demand for disposals could increase to meet the anticipated increase for materials for oil and gas or other mineral developments, road construction, and urban development.

Infrastructure

Various forms of infrastructure, including powerlines, communications towers, wind turbines, fences, and roads, occur across the CIAA landscape regardless of land ownership. These types of facilities can cause direct habitat loss from surface disturbance and functional habitat loss from behavioral avoidance by greater sage-grouse. As stated in the USFWS 12-month finding, fragmentation of habitats is cited as a primary cause of greater sage-grouse population declines because the species requires large expanses of contiguous sagebrush. Greater sage-grouse tend to avoid areas with tall structures (e.g., powerlines, communications towers, and wind turbines) due to the increased opportunity for predation by raptors. Therefore, above-ground facilities can make some habitat unsuitable for greater sage-grouse. There has been a national push to develop more wind energy and the associated transmission lines to move the energy outside the State of Wyoming. The Energy Policy Act of 2005 directs the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior to designate energy corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities. The Westwide Corridor identifies approximately 438 miles of corridor through Wyoming (DOE and BLM 2008), of which approximately 205 miles cross the Core Area. The BLM is also evaluating the route for the Gateway West Transmission Line Project from Glenrock south to the Interstate 80 corridor east of Hanna and then west along the Interstate 80 corridor out of the State of Wyoming. The proposed route would cross approximately 160 miles of the Core Area. These large projects could adversely impact greater sage-grouse up to 1 mile on either side of the transmission lines.

It is anticipated that areas having Categories 5, 6, and 7 wind potential outside USFS wilderness and BLM WSA areas have the greatest likelihood of being developed. Most of these areas are primarily in the eastern part of the state and along the Interstate 80 corridor. Approximately 18 percent of the lands identified as having high potential for wind energy in the state occur in the Core Area.

The Executive Order states that wind-energy development should be avoided in sage-grouse Core Area; therefore, it is unlikely that much development will occur in the Core Area because state approval would be required for most projects. Wind-energy developments with 30 or more turbines require approval from the Wyoming DEQ Industrial Siting Council, and smaller projects are not typically commercially viable. It is possible that wind-energy projects of fewer than 30 turbines could occur in the Core Area if the project is located only on private lands. It is not possible to predict how much wind-energy development will occur in the CIAA because there is currently a lack of available transmission lines needed to move the power. Lands with high potential for wind energy outside Core Area are the most likely to be developed, providing transmission lines needed to carry the energy are in place or can be built. Development on BLM, State of Wyoming, USFS, and WRIR lands will be subject to lek avoidance and seasonal protections for nesting habitat, but these same protections are not likely to be implemented on private lands unless specifically required by the landowner. Even with these protections, large-scale wind-energy development would adversely impact the suitability of adjacent and connectivity lands for greater sage-grouse unless they are developed on lands far away from the Core Area.

Wind-energy development in the southern and eastern parts of Wyoming are the most likely to be developed, primarily on private surface. Less development is expected on public lands. As of the beginning of fiscal year 2010, BLM Wyoming had approved only one industrial wind project (in 1997) and has applications for eight others, the largest of which is 8,767 acres (BLM 2010h). None of these projects are in the Core Area, although all are close.

Underground pipelines used to gather and transport oil or gas will increase in areas experiencing intensive development, and are expected to cause only short-term habitat loss provided the disturbance is successfully reclaimed. Pipeline disturbances can be difficult to reclaim, particularly in the very arid parts of the state, and habitat loss could be long-term if suitable vegetation for greater sage-grouse is not reestablished. Powerlines will likely increase in areas undergoing energy development and in areas near cities and towns experiencing rural subdivision. Powerlines constructed in utility corridors will minimize the impact of overhead structures being placed in undisturbed greater sage-grouse habitat. Corridors are more likely to be used in the western two-thirds of the state because the BLM and the USFS generally designate corridors on their lands, whereas the establishment and use of corridors is less likely in the eastern third of the state where there is more private land. This policy of locating corridors on public lands facilitates the granting of ROWs, but results in inherent conflicts with the Core Area because of the linear nature of the facilities and the costs associated with routing the infrastructure around leks. The Interstate 80 corridor across the southern end of the state is the preferred location for major infrastructure, but north-south facilities must cross the Core Area at some point.

Pipelines and powerlines and other types of infrastructure that go through the Core Area and non-Core Area can facilitate the transport of INNS across the landscape, which can adversely impact greater sage-grouse habitat. Pipelines and powerlines can originate, pass through, and terminate on lands having one ownership, but due to the state's scattered land pattern, it is much more likely these projects will cross through lands having different ownership. Activities on private lands could receive the same greater sage-grouse protections as BLM, state, WRIR, and USFS lands because landowners often ask for the same mitigation measures as used on adjoining lands.

Pipeline capacity will likely increase as oil and gas development continues. All RFDs for land use plans currently under revision in Wyoming (Buffalo, Bighorn Basin, and Lander) and recently completed revisions (Pinedale, Casper, Kemmerer, and Rawlins Field Offices) project additional demand for pipelines. The BLM has recently approved a pipeline originating in Opal and heading west for 678 miles (BLM 2010i) and the Overland Pass Pipeline from Opal and heading east through Lincoln, Sweetwater, Albany, and Laramie counties into Colorado (BLM 2007f). Parts of both of these lines cross the Core Area and will affect greater sage-grouse habitat adjacent to the lines. Additional pipelines are expected throughout the CIAA to gather and transport product, including moving CO_2 to facilitate enhanced oil recovery in existing oil fields.

New roads and trails are developed or established in greater sage-grouse habitats across the state, both inside and outside the Core Area, from authorized activities and recreational OHV use. Roads and trails contribute to the overall habitat loss and fragmentation occurring in the CIAA and they can result in greater sage-grouse mortality from vehicle collisions, create barriers to movement, facilitate the spread of INNS, and provide opportunities for predation. High-density road development is occurring in intensively developed oil and gas fields, which are primarily located in non-Core Area. Development of new roads will be associated with new energy development areas, mining activities, and ROWs and will occur across the state regardless of land ownership. Developed roads in the Core Area on BLM, State of Wyoming, WRIR, and USFS lands will be subject to the 5-percent disturbance cap. Unauthorized roads and trails established by recreational OHV use are expected to increase in greater sage-grouse habitat during the planning period, particularly on BLM-administered lands near communities. Due to the limited availability of BLM Rangers, enforcement of travel management decisions on BLM-administered lands is difficult and the proliferation of new road and trails that can fragment greater sage-grouse habitat is expected to continue. Private and State of Wyoming lands are expected to have less unauthorized road and trail establishment due to more controlled access.

Fences are present on most ownership lands across the State of Wyoming and are used primarily to delineate property boundaries and to manage livestock. Fences can cause greater sage-grouse to avoid adjacent habitats because raptors can use them as hunting perches and they can create predator corridors and contribute to overall habitat fragmentation. In addition, fences can cause direct greater sage-grouse mortality through bird collision with fence wires. Not all fences present the same mortality risk to greater sage-grouse because the risk depends on the style of fence, landscape topography, and spatial proximity to seasonal habitats. It is expected that the level of fencing will increase on private land and in areas near communities as more lands become subdivided. Fencing on BLM, State of Wyoming, WRIR, and USFS lands is likely to remain steady or increase in response to energy development and grazing management concerns.

Invasive Species

INNS spread as areas are disturbed and would adversely impact greater sage-grouse habitat by reducing or eliminating native vegetation required for food and cover. INNS in the CIAA consist of annual grasses (primarily cheatgrass) or noxious weeds, but also could be native conifers that encroach sagebrush communities. The potential for the establishment or spread of INNS increases with each surface-disturbing activity, regardless of land ownership. Because development on private lands is not required to implement INNS prevention strategies, the potential for adverse impacts from development is greater on private lands. In areas experiencing intensive development or large-scale disturbance, the potential is even greater. The limitations on the amount of surface disturbance allowed per square mile on BLM, state, WRIR, and USFS lands in the Core Area will reduce the risk of INNS getting established in new areas over the risk in non-Core Area. Because most of the state is in non-Core Area, the risk of INNS getting established and adversely affecting non-Core Area habitat will increase on all lands as there will be no surface disturbance limits. INNS that spread from non-Core Area to Core Area will result in adverse impacts to Core Area habitat quality. Similar as described for energy development and infrastructure, surface disturbance on private lands inside or outside the Core Area will not be limited unless required by the land owner.

In many parts of the State of Wyoming, juniper is expanding within its current range and moving into sagebrush habitats regardless of land ownership. Pinyon-juniper woodlands have expanded almost tenfold in the intermountain west since European settlement in greater sage-grouse range due to the reduced role of fire, the introduction of livestock grazing, increases in global CO_2 concentrations, climate change, and natural recovery from past disturbances (USFWS 2010). Juniper can eventually replace sagebrush and reduce the availability of greater sage-grouse habitat; female greater sage-grouse are known to avoid conifers in winter (Doherty et al. 2008). Conservation actions to control or eradicate juniper, including mechanical, herbicide, cutting, and burning treatments, are occurring in the CIAA; however, treatments are not keeping pace with the rate of juniper encroachment in most areas. In most areas of the Wyoming, treatments by Firewise Communities, the WGFD, and other groups or individuals are conducted on fewer acres of private, WRIR, and state lands primarily due to the costs of the treatments. Including the projects completed on BLM and USFS lands, juniper encroachment outpaces treatment, and treatments have not been determined to reestablish greater sage-grouse habitat (USFWS 2010). Vegetation mapping is not sufficiently complete to identify how much the Core Area is threatened with juniper encroachment. Fire suppression in the Core Area is emphasized in the Executive Order, which makes it unlikely that fire will be heavily utilized for vegetative treatments, making mechanical treatments the most likely method to address juniper encroachment.

Wildfire

Wildfire that burns sagebrush ecosystems in the CIAA will result in the long-term loss of sagebrush, affect the availability of insects, and increase the risk of INNS establishing in greater sage-grouse habitats. Wildfire will likely occur across Wyoming, regardless of land ownership. Large wildfires in Wyoming historically have occurred in forests or on lands with a substantial amount of timber that do not provide habitat for greater sage-grouse (see Map 18 of the Summary of the Analysis of the Management Situation [BLM 2009b] showing fire locations over the last 20 years); however, small wildfires are common in sagebrush communities. Small wildfires will result in localized impacts to greater sage-grouse habitat, whereas large wildfires could result in impacts to greater sage-grouse populations (USFWS 2010). It is impossible to predict the level of impacts that wildfire will contribute to overall habitat loss in the future, but efforts to suppress fire in greater sage-grouse habitat can result in beneficial impacts. The BLM has issued a policy to make greater sage-grouse habitats, particularly in the Core Area, a priority for fire suppression, regardless of land ownership. It is anticipated that suppression of wildfires on all lands in the Core Area in the CIAA, regardless of ownership, will be a priority. Outside the Core Area, priority will likely be given to areas with energy-development infrastructure and near homesites, which typically provide little suitable habitat for greater sage-grouse.

Climate change and the spread of INNS are increasing the likelihood of adverse impacts to greater sage-grouse populations from wildfire. In the Great Divide Basin, 27 percent of greater sage-grouse habitat has burned since 1980. Fire within 33.6 miles of a lek is one of two primary factors in predicting loss of a lek (USFWS 2010). Sagebrush recovery can take decades, while INNS can take over a site almost immediately following fire. Fire return intervals for areas infested with INNS are far more frequent, sometimes as short as 2 or 3 years, which would prevent burned areas from returning to suitable greater sage-grouse habitat.

Livestock Grazing

Domestic livestock grazing occurs on most lands in the Wyoming that support greater sage-grouse habitat, including federally managed lands. Heavy grazing use that reduces vegetative cover needed for nest concealment, alters composition of the plant community, and increases opportunities for predators can occur on all ownership lands in the Core Area and non-Core Area. High utilization levels typically occur in riparian-wetland habitats and near water development and mineral supplement areas, which can degrade brood-rearing and nesting habitats.

Livestock management typically involves the use of fencing and water developments (wells, pipelines, reservoirs, and spring developments) that can result in the loss, degradation, and fragmentation of greater sage-grouse habitat. Fences and water developments are utilized on all ownership lands in the CIAA. The number of future projects constructed in the Core Area could be reduced based on habitat-disturbance calculations. If projects are denied on BLM, State of Wyoming, WRIR, and USFS lands due to disturbance caps, it is assumed that the number of projects will increase on private lands and outside the Core Area to compensate. One of the historic contributors to the loss of habitat is the conversion of sagebrush habitat to agricultural lands. Overall, the contribution of impacts from livestock grazing by alternative would not vary substantially because there is little difference in the amount of land open and closed to grazing among the alternatives.

Summary

Central Wyoming has the densest concentration of greater sage-grouse in the United States and has been identified by the USFWS as of the highest priority for persistence of the species (USFWS 2010). A substantial part of the Core Area outside the planning area is pressured by continued energy and ROW development, urbanization, fire, and livestock grazing. The level of cumulative impacts from the threats described above is predicated on the fact that management of the Core Area is protective enough to maintain habitat to support 83 percent of the current greater sage-grouse population in the state. Reducing the level of adverse impacts in areas supporting the largest number of greater sage-grouse also depends on lands continuing to be managed using the Core Area strategy. The contribution of cumulative impacts to greater sage-grouse in the CIAA is anticipated to be least under Alternative B, which provides the most measures to minimize habitat loss and fragmentation and closes the most habitat to surface disturbance related to oil and gas development and infrastructure in the planning area, followed by alternatives D, A, and C. The greatest contribution of cumulative adverse impacts to greater sage-grouse in the CIAA is expected under Alternative C, which allows the greatest level of surface disturbance and most development and resource uses in the planning area with the least amount of restrictions. Alternative D incorporates the Core Area strategy, and therefore will be consistent with management of BLM-administered, State of Wyoming, WRIR, and USFS lands across the CIAA.

4.10.2. Cumulative Impacts to Air Quality with regard to Public Health and Welfare from Management Actions

Cumulative Impact Assessment Area

The planning area and designated CAA Class I areas within 100 kilometers (approximately 60 miles) of the planning area.

Analysis of Cumulative Impacts

Cumulative impacts to air quality were analyzed for each alternative by assessing cumulative emissions in the planning area over the life of the plan. Cumulative emissions were assessed in two ways — by comparing to statewide emissions from 2005 and by "growing" estimated BLM emissions for future years. The Wyoming DEQ compiles a statewide emissions inventory of air pollutants every 3 years as required by the EPA. The most recent statewide emissions inventory available was compiled for 42 different source categories for 2005 actual emissions. The 2005 statewide emissions data were obtained from the EPA National Emissions Inventory (EPA 2005). Table 4.54, "BLM Contribution to Cumulative Annual Statewide Emissions" (p. 1221) shows the estimated emissions for BLM actions and activities in the planning area compared to Wyoming statewide emissions. The estimated emissions for BLM actions and activities were then scaled up to reflect potential increases in non-BLM actions in the planning area. Table 4.55, "Cumulative Annual Emissions Summary for BLM and Non-BLM Activities in the Lander Planning Area" (p. 1222) shows estimated emissions under each alternative for projected BLM actions, projected non-BLM actions, and the cumulative total of these actions. Emissions estimates from non-BLM oil and gas activities were calculated using data on existing and projected oil and gas wells in the planning area from the Lander Field Office RFD scenario for oil and gas (BLM 2009d). The projected numbers of wells and gas production rates estimated for private and fee land (i.e., non-federal) in the planning area for 2018 and 2027 were used to calculate cumulative emissions from oil and gas activities. For cumulative impacts associated with non-oil and gas mineral development (i.e., bentonite, uranium, and gold), it was assumed that 100 percent of these actions would occur on federal mineral estate (i.e., no additional emissions from non-BLM actions) and the cumulative emissions have been included in the projected emissions estimates for 2018 and 2027. The analysis of non-BLM mineral materials disposal activities is based on the proportional mineral estate ownership in the planning area (41 percent federal and 59 percent non-federal). The calculation of cumulative impacts for air quality from non-mineral, non-BLM activities is based on the proportion of surface ownership in the planning area (38 percent BLM-administered and 62 percent non BLM-administered).

Table 4.54. BLM Contribution to Cumulative Annual Statewide Emissions

Pollutant	BLM Estimated Emissions in the Lander Planning Area (tons per year)	2005 Wyoming Statewide Emissions (tons per year)	Total (tons per year)	Percent Contribution of BLM Lander Planning Area Emissions to Statewide Emissions
Base Year - 2008				
PM_{10}	761	846,689	847,451	0.09
$PM_{2.5}$	135	133,849	133,984	0.10
NO_x	678	185,813	186,491	0.36
SO_2	11	122,389	122,400	0.01
CO	1,138	399,257	400,395	0.28
VOCs	1,726	79,575	81,301	2.12
Alternative A - 2018				
PM_{10}	2,195	846,689	848,884	0.26
$PM_{2.5}$	371	133,849	134,220	0.28
NO_x	1,829	185,813	187,642	0.97
SO_2	23	122,389	122,412	0.02
CO	1,734	399,257	400,991	0.43
VOCs	4,737	79,575	84,312	5.62
Alternative B - 2018				
PM_{10}	1,760	846,689	848,449	0.21
$PM_{2.5}$	359	133,849	134,208	0.27
NO_x	1,420	185,813	187,234	0.76
SO_2	24	122,389	122,413	0.02
CO	2,077	399,257	401,334	0.52
VOCs	4,019	79,575	83,594	4.81
Alternative C - 2018				
PM_{10}	2,887	846,689	849,576	0.34
$PM_{2.5}$	443	133,849	134,292	0.33
NO_x	1,873	185,813	187,687	1.00
SO_2	25	122,389	122,413	0.02
CO	1,758	399,257	401,015	0.44
VOCs	4,754	79,575	84,328	5.64
Alternative D - 2018				
PM_{10}	2,122	846,689	848,811	0.25
$PM_{2.5}$	373	133,849	134,222	0.28
NO_x	1,747	185,813	187,560	0.93
SO_2	24	122,389	122,412	0.02
CO	1,872	399,257	401,129	0.47
VOCs	4,592	79,575	84,167	5.46

Source: EPA 2005

BLM Bureau of Land Management
CO carbon monoxide
NO_x nitrogen oxides
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
PM_{10} particulate matter less than 10 microns in diameter
SO_2 sulfur dioxide
VOC volatile organic compound

Table 4.55. Cumulative Annual Emissions Summary for BLM and Non-BLM Activities in the Lander Planning Area

Scenario	**PM_{10} (Tons per Year)**			**$PM_{2.5}$ (Tons per Year)**			**NO_x (Tons per Year)**			**SO_2 (Tons per Year)**			**CO (Tons per Year)**			**VOCs (Tons per Year)**			**HAPs (Tons per Year)**		
	BLM	**Non-BLM**	**Total**	**BLM**	**Non-BLM**	**Total**	**BLM**	**Non-BLM**	**Total**	**BLM**	**Non-BLM**	**Total**	**BLM**	**Non-BLM**	**Total**	**BLM**	**Non-BLM**	**Total**	**BLM**	**Non-BLM**	**Total**
Base Year – 2008																					
Base Year	761	810	1,572	135	151	286	678	496	1,174	11	12	23	1,138	1,583	2,720	1,726	1,062	2,788	270	152	422
Forecast Year – 2018																					
Alternative A	2,195	1,210	3,405	371	202	573	1,829	887	2,716	23	16	39	1,734	1,855	3,589	4,737	2,373	7,110	786	383	1,168
Alternative B	1,760	1,345	3,106	359	284	642	1,420	711	2,132	24	22	47	2,077	2,657	4,733	4,019	2,071	6,091	654	325	979
Alternative C	2,887	2,329	5,217	443	320	763	1,873	953	2,826	25	19	44	1,758	1,891	3,649	4,754	2,386	7,140	788	384	1,173
Alternative D	2,122	1,369	3,491	373	238	611	1,747	857	2,604	24	18	42	1,872	2,134	4,005	4,592	2,316	6,908	759	371	1,130
Forecast Year – 2027																					
Alternative A	2,047	1,160	3,208	344	189	533	1,528	702	2,230	22	15	37	1,583	1,760	3,343	3,722	1,863	5,585	616	300	915
Alternative B	1,621	1,290	2,911	335	271	606	1,173	552	1,725	23	22	45	1,953	2,574	4,527	3,145	1,627	4,772	509	253	762
Alternative C	2,737	2,278	5,015	416	304	720	1,546	725	2,271	24	18	41	1,596	1,778	3,374	3,734	1,874	5,608	617	301	919
Alternative D	1,976	1,318	3,294	347	225	572	1,458	675	2,133	23	17	40	1,727	2,040	3,767	3,606	1,820	5,426	594	291	885

Source: Appendix U (p. 1545)

BLM	Bureau of Land Management
CO	carbon monoxide
HAPs	hazardous air pollutants
NO_x	nitrogen oxides
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
SO_2	sulfur dioxide
VOC	volatile organic compound

BLM and non-BLM reasonably foreseeable actions are anticipated to increase emissions in the planning area over the planning period. For the planning area, cumulative air quality impacts (as measured against national and state ambient air quality standards) are anticipated to be roughly the same on BLM and non-BLM-administered lands because it is assumed that the density of activities are the same in both areas. Because of proposed development restrictions on BLM-administered lands, adverse cumulative impacts to air quality are anticipated to be the least under Alternative B. Cumulative projected emissions under alternatives A, C, and D are similar; all are projected to be greater than under Alternative B. Cumulative emissions in the planning area are not anticipated to result in air quality impacts that exceed national or state ambient air quality standards because the emissions sources will likely be widely dispersed.

Potential cumulative concentrations of CO, NO_X, and SO_2 could increase slightly, but would be unlikely to exceed air quality standards. Existing concentrations of O_3 in the planning area are approximately 94 percent of the 8-hour ambient air quality standard. Existing PM_{10} concentrations in the planning area are approximately 40 percent of the annual ambient air quality standard. O_3 and particulate matter concentrations could be an issue of concern during the planning period. The BLM will perform quantitative analyses of potential concentrations, as appropriate, when specific projects are proposed. The BLM will continue to work with the Wyoming DEQ and the EPA to ensure that emissions from BLM activities do not contribute to any violations of the NAAQS or Wyoming Ambient Air Quality Standards.

Potential cumulative emissions are likely to result in minor impacts to atmospheric deposition, and precipitation pH would likely stay about the same. Potential total nitrogen deposition and total sulfur deposition would likely stay about the same, and would be unlikely to exceed levels of concern. The BLM will perform quantitative analyses of potential atmospheric deposition, as appropriate, when specific projects are proposed. The BLM will continue to work with the Wyoming DEQ, the EPA, the National Park Service, the USFS, and the USFWS to ensure that emissions from BLM activities do not contribute to any exceedances of the deposition levels of concern.

Potential visibility would likely stay about the same or degrade slightly, and could be an issue of concern during the life of the plan. The BLM will perform quantitative analyses of potential visibility, as appropriate, when specific projects are proposed. The BLM will continue to work with the Wyoming DEQ, the EPA, the National Park Service, and the USFS to ensure that emissions from BLM activities do not contribute to adverse impacts to visibility.

4.10.3. Cumulative Impacts to Water from Management Actions

Cumulative Impact Assessment Area

The CIAAs are the significant watersheds of the Wind River and Sweetwater River/North Platte River, both inside and upstream portions outside the planning area, and portions of the Great Divide Basin watersheds in the planning area. Fourth-order watersheds were used as the base unit of analysis because impacts from management actions proposed under the RMP and other existing plans are not expected to have cumulative hydrologic influence beyond this scale. Given that the hydrologic influence is primarily focused in the stream channels and that delineation of the CIAA was based on watershed boundaries, the area of analysis is sufficient. More specific information for the fourth-order Hydrologic Unit Code (HUC) watersheds is provided below in the discussion of riparian-wetland areas.

Analysis of Cumulative Impacts

The assumptions used in this cumulative impact assessment for water and riparian-wetlands include:

Impacts of Invasive Species

- INNS replace the native riparian-wetland-obligate species, which reduces soil stability, water infiltration rates, and water holding capacity, all adversely affecting riparian-wetland health.
- Water quality has thresholds that are established by their classification and designated beneficial uses. For example, Class 1 waters allow for no degradation of their water quality, whereas the other categories allow for varying degrees of water quality degradation so long as the designated beneficial uses are supported.
- Surface-disturbing activities on all land tenures are all subject to the WYPDES Storm Water Discharge control provisions, which are administered by the Wyoming DEQ. Water quality should not be adversely affected by surface-disturbing activities of 1 or more acres because the WYPDES program is specifically designed to keep sediment and any stored fuels and lubricants from construction/industrial activities onsite and out of drainages

Abandoned Mine Lands

- AML projects will increase disturbance initially, but over the long term will bring stability to historic abandoned mines and result in beneficial impacts to riparian-wetland resources.
- Except for on a short-term basis, AML work reduces erosion and improves water infiltration, which result in net beneficial impacts to water quality.
- The presence of unnaturally occurring bare ground will lead to increases of runoff and sedimentation. The severity of the runoff and sedimentation will vary by the design and management of the bare ground.
- The discharge of produced water into a riparian-wetland system will adversely impact the system. The severity of the impacts will vary.

Accelerated runoff and agricultural return flow

- Accelerated runoff can contribute to excessive energy in the stream systems and accelerate downcutting, reduce bank stability, increase movement of sediments downstream, and introduce fertilizers and pesticide agents.

Agricultural commodity production

- Most agricultural commodities require irrigation from local stream systems, which can adversely impact riparian-wetland resources through the loss of available water to support riparian-wetland-obligate species, and through return flow of irrigation water carrying sediment, soil amendments (fertilizers), and pesticides.
- Surface-disturbing activities such as mineral development and road construction impact localized areas, removing vegetation, compacting hydric soils, and creating a vector for runoff and INNS establishment

Cumulative Impacts Common Among Watersheds

Adverse impacts to water quality are products of surface-disturbing activities associated with mineral resource development, motorized vehicle use, road construction, agricultural land uses, and improper livestock grazing management. These activities lead to increases in runoff and sedimentation and have the potential to degrade water quality. Increased development leads to increased INNS infestations. Land management decisions on BLM and other federal, state, and private lands would likely result in changes in water quality beyond designated uses in some locations within the CIAA.

The above discussion under greater sage-grouse describes impacts to greater sage-grouse from various types of activities. To the extent that those activities result in the removal or degradation of habitat, it is equally likely that water resources would be adversely affected. Water quality can be thought of as the sum measure of the outputs for a given watershed.

BLM-authorized activities, along with other federal, state, and private land use decisions, could degrade water quality beyond the designated use of receiving waterbodies in some locations of the CIAA, thereby changing water quality beyond designated uses in some locations. Mitigation and BMPs applied as a result of state (CWA administration) and federal regulation is expected to prevent or moderate water-quality degradation. If an authorized surface-disturbing activity such as storm water control at industrial or construction sites violates Wyoming state law and the CWA water-quality regulations, the Wyoming DEQ and the EPA would impose substantial daily fines for the period of violation.

Because development from all sources is likely to continue, cumulative actions would magnify adverse impacts associated with BLM-authorized activities. Even with proper BLM and Wyoming Oil and Gas Conservation Commission oversight, improper casing and cementing of wells, undetected spills, or leachate from produced-water pits could introduce contaminants into groundwater. Existing development, combined with the RFD, will increase the potential for such adverse impacts.

Cumulative impacts would likely be the greatest in the Wind River Basin outside the Dubois area, the Gas Hills portion of the Sweetwater River drainage, and the Great Divide Basin as a result of mineral development and surface discharge of produced water, combined with other surface-disturbing activities. In addition, cumulative impacts would likely increase in the Dubois and Lander Slope areas of the western Wind River Basin as a result of the land under private ownership and potential population in these areas, primarily through rural subdivision development. Although existing and future activities on these lands is not well known, it is assumed that surface-disturbing activities (e.g., mineral development and general construction) will occur. Private landowners and, in some cases, State of Wyoming lands are also subject to the storm water discharge control provisions of the CWA, and they are required to control sediment on construction and industrial sites. Therefore, the BLM does not anticipated that impacts would be greater on private or state lands. However, discharging produced waters into ephemeral drainages from private or State of Wyoming leases or not adequately considering water treatment options for produced water disposal could result in major impacts.

Cumulative impacts of aquifer depletion during the production of CBNG and uranium from federal, state, and private wells would result in a permanent loss of these water resources. Although this would result in an irreversible and irretrievable commitment of these resources, the depths of many of these formations (1,000 to 10,000 feet) make the practicality of the use of these resources in the future unlikely. However, lowering the water table and pressure in these CBNG formations could impact associated artesian water resources. Typically, these formations are non-tributary to surface waters, but connected to surface waters through springs along faults or where they outcrop. During site-specific project planning, water quality sampling, isotopic analysis, and groundwater modeling would be used to evaluate this potential, and decisions would be made to protect surface waters as appropriate.

Cumulative impacts from surface-disturbing activities, water developments, and surface discharges from CBNG and conventional oil and gas operations could degrade water quality beyond the designated use of receiving waterbodies in the Wind River Basin.

In conjunction with the direct and indirect impacts of the alternatives, adverse impacts to water resources would be greatest under Alternative C because of the anticipated increases in development. Under Alternative B, increased restrictions on development, recreation, and range improvement projects would reduce the potential for surface disturbance and subsequent increases in erosion, runoff, and sediment delivery to surface waters. Alternative D would result in the second fewest impacts, and would result in more adverse impacts than Alternative B but fewer than alternatives A and C.

Wind River

The total acres of cumulative impact analysis in the Wind River drainage considered is 4,970,802, of which 23 percent are BLM-administered public lands.

The Upper Wind River watershed is primarily in the Dubois area, but extends through the WRIR, ending in the vicinity of the Riverton Dome East oil field. This watershed is comprised of approximately 1,630,991 acres of land and is entirely encompassed within the planning area boundaries. Only 4 percent of these acres are BLM-administered lands. The largest landowners in this watershed are the Shoshone National Forest and WRIR (38 percent each followed by private landowners (18 percent).

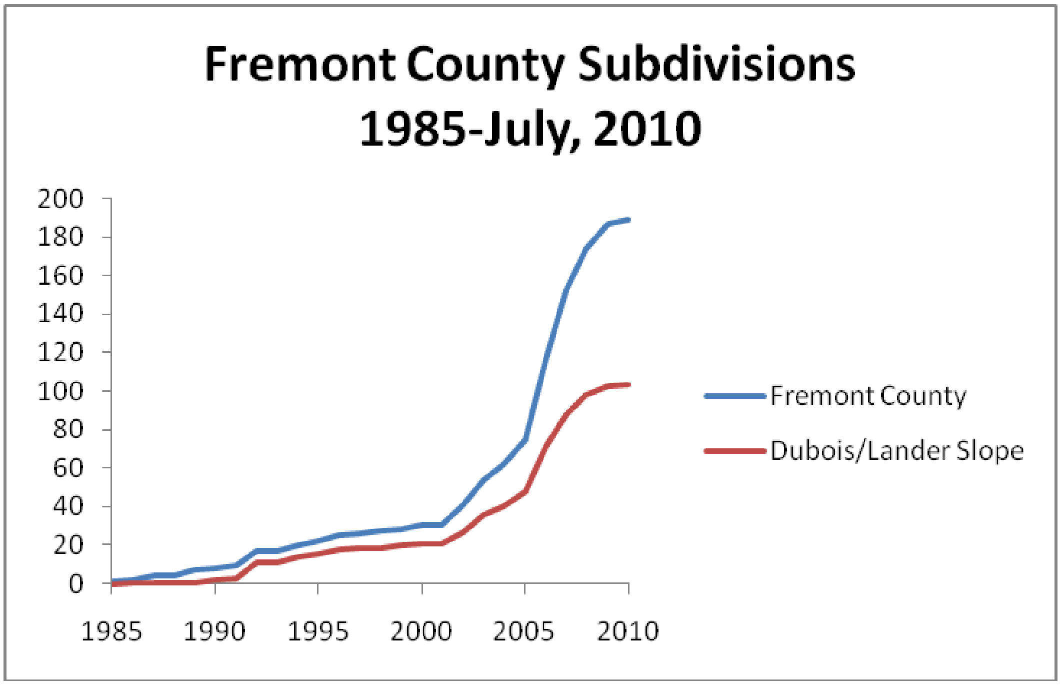
Past and present impacts to water resources in the upper reaches of this watershed are primarily a result of timber harvest, wildfire, rural and agricultural development, and livestock grazing. Actions such as timber harvest and wildfire often can lead to movement of large amounts of sediments into riparian-wetland systems. Historically, the Shoshone National Forest has performed approximately 12,000 acres of vegetative treatments including mechanical treatments, timber sales, and prescribed burning.

Dubois, Wyoming, occupies a small portion of this watershed and a large portion of this watershed is rural private land used for agricultural commodity production. Most of these commodities require irrigation from local stream systems, which can adversely impact water resources through the loss of available water to support riparian-wetland-obligate species, and through return flow of irrigation and accelerated runoff. According to the Wyoming DEQ and the Dubois Crowheart Conservation District, waterborne pathogens (*E. coli*) in the Wind River are a concern between the Dubois and the WRIR boundary and in the lower portions of Horse Creek (Wyoming DEQ 2010a). There is currently a watershed plan, developed by the Popo Agie Conservation District, to remediate this problem. Twin Creek has been identified by the Wyoming DEQ as being of concern for habitat degradation. There is also a portion of Poison Creek, for an undetermined distance above Boysen Reservoir, that is impaired for contact recreation use.

Over time, as the monitoring and assessment of the state's waters by the Wyoming DEQ progresses, more waterbodies can be expected to be found to have use impairments that will require remediation. The BLM will, as has been done for the Sweetwater watershed, attempt to mitigate impacts to water quality by reviewing existing data, such as PFC and rangeland health assessments, and nominate streams for monitoring by the Wyoming DEQ that have concerns indicated by data.

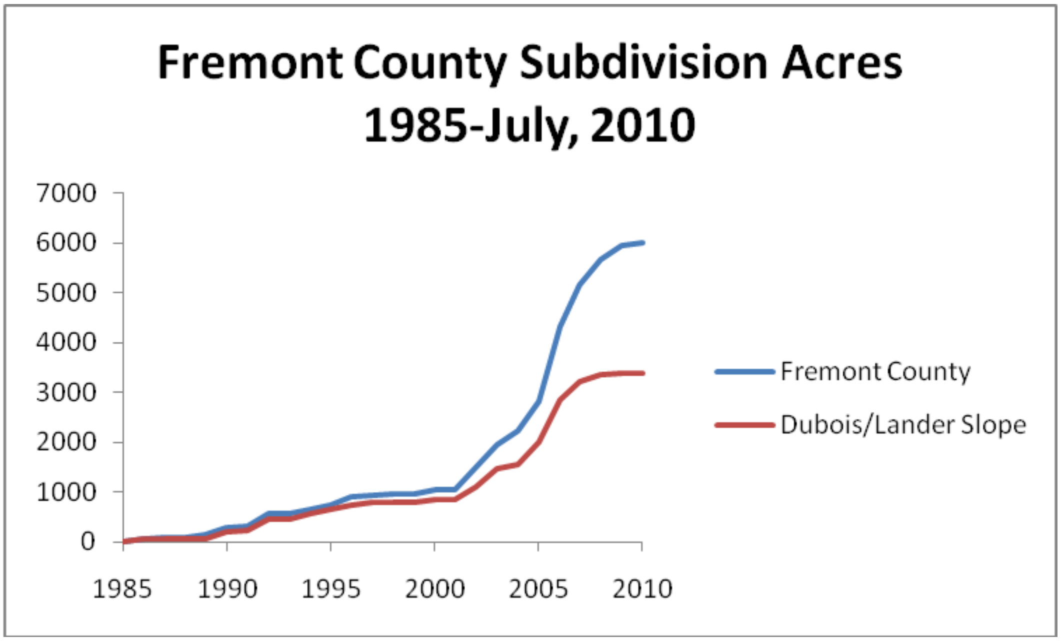
The major surface-disturbing activity, subject to WYPDES Storm Water permitting requirements, on adjacent private lands is subdivision development. The upper Wind River, in the Dubois area north of the WRIR boundary, has seen subdivision development only paralleled in the planning area by parts of the Lander Slope. Subdivision development occurs solely on private lands and is a major surface-disturbing activity affecting the Upper Wind River. From 1985 to present, the amount of subdivision activity is an indication of both demand and constraints on such development. The recent history of subdivision development in Fremont County is reflected in the two graphs below. Lot size in the county is also influenced by state law, that before 2008, precluded county regulation of subdivisions with lots smaller than 35 acres; the 2008 law allows counties, should they so choose, to require large-tract developers to file plats, record contracts for deeds, and disclose plans for providing utilities, road maintenance, and fire protection. As of March 2010, Natrona County has taken on these new powers and Fremont County has not.

In the 1980s, there was a low demand for subdivision housing. The early 1990s saw a slight upturn in rural subdivisions. The period from 2002 through 2008 saw the largest growth in subdivisions. The growth of subdivisions in Fremont County shown in Figure 4.13, “Fremont County Subdivisions, 1985-2010” (p. 1227) closely mirrors the associated acres under subdivision development shown in Figure 4.14, “Acres under Subdivision Development in Fremont County, 1985-2010” (p. 1227). In both figures the Dubois area and the Lander Slope account for slightly more than half of the number of subdivisions (54 percent) and the total acreage under subdivisions (57 percent), even though they comprise less than 15 percent of the private land in the county. History suggests that future subdivision growth will be linked to how robust the local economy is. The present economic situation in the county, and the country at large, suggests that there will be no rapid upturn in subdivision development for the next several years. Much of the demand for subdivisions comes from present and former residents of the county and the state who desire to live outside towns (Mealor 2007).



Source: Fremont County 2010

Figure 4.13. Fremont County Subdivisions, 1985-2010



Source: Fremont County 2010

Figure 4.14. Acres under Subdivision Development in Fremont County, 1985-2010

Impacts from subdivision development include increases in traffic, noise, and human activity that can change the native plant community in forested areas and on rangelands; farmland subdivision can decrease the farmland acreage base in the county. More physical impacts come from associated roads and yards that can increase and concentrate water in small areas, which can lead to soil loss and increased sediment loads in streams.

The Lower Wind River watershed is shown on Map 138. The Lower Wind River watershed is just over 1 million acres, of which 89 percent is within the boundaries of the planning area. The majority landowner in this watershed is the WRIR (39 percent), followed by private landowners (27 percent), the BLM (approximately 18 percent), and the Bureau of Reclamation (10 percent). Cumulative impacts to water resources throughout this watershed result primarily from agricultural land use, livestock grazing, and oil and gas development.

As discussed for the Upper Wind River watershed, most of the WRIR was historically open, and will remain open, to livestock grazing, and water resources will remain vulnerable to adverse changes in hydrology and vegetative communities. Livestock stocking rates are generally low on the WRIR and livestock-related impacts would be expected to be minor.

A large portion of this watershed is private land used for agricultural commodity production and Bureau of Reclamation lands supporting irrigation systems on private lands. The impacts from these commodities are discussed under the assumptions for analysis. Additional impacts historically observed from the presence of private land, in particular irrigated fields, in this watershed are the high potential source of INNS seed, which adversely impacts water resources.

Oil and gas development occurs in localized areas in the Maverick Springs, Little Dome, Pavillion, Muddy Ridge, and part the Gun Barrel oil and gas fields. These fields, in particular the Pavillion, Muddy Ridge, and Gun Barrel fields have been very active in recent years, leading to a high level of surface-disturbing activities. These activities contribute to the sedimentation of riparian-wetland systems adjacent to these fields and increases in overland flow.

This watershed encompasses Boysen Reservoir and Ocean Lake. Both of these waterbodies are managed by the State of Wyoming and are protected from surface-disturbing activities such as oil and gas development; these protection benefit local riparian-wetland resources. However, these waterbodies are highly utilized for recreation activities such as OHV use, camping, fishing, and hunting activities, which results in potential adverse impacts to riparian-wetland areas. The cumulative impacts to water resources in the Lower Wind River watershed will be influenced largely by management on WRIR and Bureau of Reclamation lands in the upstream portions of the watershed. However, the additional riparian-wetland buffers and limitations on livestock utilization in riparian-wetland areas provided under Alternative B would beneficially impact riparian-wetland resources cumulatively. The limitations on livestock utilization in riparian-wetland habitats provided under Alternative D would likewise result in cumulative beneficial impacts to riparian-wetland resources in this watershed.

Most of the oil and gas production in the planning area occurs in this watershed, primarily in the Badwater, Lysite, Bridger, Alkali, and Poison creeks drainages; Twin Creek and Little Popo Agie River, Big and Little Sand draws, and Alkali Butte; and lower Beaver Creek. There are a few wells in the rest of the basin, including several in Dubois, along the Popo Agie River northeast of Lander, Muskrat Creek, and other locations. The projected acres of surface disturbance associated with oil and gas development from non-BLM actions are identified in Appendix T (p. 1535). Future production is expected to occur primarily in and around the existing oil fields. The amount of surface disturbance associated with this development is expected to increase in and adjacent to these existing fields, rather than development of new fields.

The Wyoming DEQ AML Division is completing safety and rehabilitation work on abandoned mines in the Copper Mountain (Bridger Mountains) area. There could be a few new projects in this area. Near the Hudson, AML program work will occur in conjunction with old coal mines primarily on patented mine land where mining activity ended by the late 1920s. The Gas Hills area has seen much AML work in the past, but it is not expected to continue at its present rate. There are limited areas with surface and groundwater quality problems from past mining and milling activities in the Gas Hills uranium district.

Sweetwater River and North Platte River Drainage

The total acres of cumulative impact analysis area in the Sweetwater River and North Platte River drainage is 1,894,398, of which 59 percent is BLM-administered public land. The CWA Class 1 water-quality portion of the Sweetwater River has a watershed area of 545,425 acres, of which 395,874 acres (73 percent) are BLM-administered public lands. This Class 1 water-quality portion of the Sweetwater River is located from the confluence with Alkali Creek and upstream to its origin in the Bridger National Forest at Sweetwater Gap on the Continental Divide. This section has the highest water-quality protections and allows for no degradation of water quality. Threats to these systems include mining, oil development, AML work, and water depletion.

The watershed of the Sweetwater River includes much the area of past gold mining on South Pass. Abandoned placer gold dredging operations have disturbed long stretches of Rock Creek as well as parts of Willow Creek and other creeks in the South Pass area. Land tenure is a patchwork of patented mining land, State of Wyoming land, and claims on BLM-administered public lands. The BLM believes that approximately half the annual gold mining activity on South Pass occurs on land tenures other than BLM. Currently, there are a few seasonally active placer mining operations that work small (less than ¼ acre) portions of draws and creeks, but there are no large mining operations. There is no expectation that this will change in the future.

There is no expectation of substantial change to the existing level of oil development in this watershed. Only a portion of this activity occurs on private and state lands. The Bison Basin oilfield, which consists of a few wells, is along an ephemeral drainage that is a tributary to the Sweetwater River, approximately 12 miles south of the river. There is some oil production in the Sheep Creek, Happy Spring, and Crooks Gap oilfields. There are a few scattered wells in other locations such as Cedar Ridge, Long Creek, and the top of Crooks Mountain.

This watershed also includes Wyoming DEQ AML projects to mitigate safety concerns and stabilize old mines. The Wyoming DEQ AML Division has completed safety and rehabilitation work on approximately 100 abandoned mines and sites in the South Pass area. Mercury in streambed sediment of the local streams, especially Rock Creek and Willow Creek, does not appear to affect water quality, but this pollutant could be suspended if these sediments are disturbed by dredging. WGFD fish tissue sampling showed that mercury levels in Willow Creek were below the U.S. Food and Drug Administration guideline for action limit in muscle, but higher in gut tissues. This trend does not suggest a human health concern, but could be a concern for fish-eating wildlife. The Wyoming DEQ assessment of Willow Creek shows full support of aquatic life uses.

Extensive AML work has occurred in the Gas Hills and the Green Mountain-Crooks Gap area, much of it on private land. There are some projects nearing completion in these areas, and one project is scheduled for an abandoned coal mine in the Muddy Gap area. After 2013, new projects on South Pass and in the Gas Hills are expected to commence. AML work in the Green Mountain-Crooks Gap area will be largely completed in the next couple of years. As indicated above, AML work results in a long-term beneficial impact to water resources.

Some adverse impacts to water quality from uranium mining are anticipated in the vicinity of Jeffrey City, both in situ and open pit or subsurface mining as well as discharges from tailings piles. As indicated above, requirements of the WYPDES program should alleviate some of the adverse impacts historically observed.

In 2002, the USFWS issued a revised intra-service biological opinion and conference opinion regarding federal actions that individually deplete 25 acre-feet or less to the Platte River System (USFWS 1996). Individual projects that deplete less than 25 acre-feet are considered minor depletions. Individual projects that deplete more than 25 acre-feet are considered major depletions and require consultation. Cumulatively, all BLM and non-BLM actions over the planning period are anticipated to deplete more than 25 acre-feet of water in the Platte River System, but none of the proposed actions individually would exceed 25 acre-feet. The USFWS (USFWS 2002b) indicates that most of the proposed federal and non-federal actions within the Platte River System are anticipated to involve water depletions. The USFWS and Bureau of Reclamation are currently addressing the issue of water depletion in the Platte River System through preparation of the Platte River Recovery Implementation Program EIS (USFWS 2002b). The cumulative impact of water depletions within the Platte River System to special status species downstream in the Platte River is well documented (BOR and USFWS 2005) and expected to continue during the planning period.

The *Fish and Wildlife Resources* and the *Special Status Species – Fish* sections of this chapter described project water depletions from and potential adverse impacts to special status species in the Sweetwater River watershed, which is a part of the Platte River System, from BLM actions described in this RMP. Water depletions from non-BLM actions are anticipated from development of oil and gas wells, fish and wildlife water sources, and livestock water sources. Development of fish and wildlife water sources on private lands in the planning area not administered by the BLM are not anticipated.

Human population and related development in the Sweetwater River watershed has historically been tied to boom and bust cycles of the mineral industries; these cycles resulted in almost 5,000 people living at Jeffrey City in the late 1970s but only a few residents today. The same is true for Atlantic City and South Pass City. Miners Delight and Lewiston are now ghost towns. Population-driven subdivision development in this area will occur only in relation to favorable market conditions for local minerals. Water depletion due to such development is not anticipated in the near future, even with moderate interest in uranium.

Because projected water depletions from BLM actions are highest under Alternative C and because water depletions from non-BLM actions are not expected to vary by alternative, the greatest cumulative adverse water depletions are anticipated under Alternative C and the least cumulative adverse water depletions are anticipated under Alternative B. Alternative D would result in impacts between alternatives A and B concerning depletions in the Sweetwater River watershed and those minor portions of the Platte River System in the planning area.

Crooks Creek is an impaired waterbody due to oil and grease contamination of unknown origin. The BLM compiled a list of streams in the Sweetwater River watershed with identified concerns from PFC inventory data, and submitted the list to the Wyoming DEQ in 2004 for inclusion on their monitoring program.

Great Divide Basin

There are 161,324 total acres of the Great Divide Basin in the planning area, 92 percent of which are BLM-administered public lands. The Great Divide Basin is influenced by oil and gas development, including CBNG, and exploration, and most recently by increased uranium exploration and potential mining; this activity occurs in the adjoining Rawlins and Rock Springs planning areas and on private and State of Wyoming lands. Both in situ mining projects and traditional shaft and open-pit mines would adversely impact surface water and groundwater. There is some oil production in the Red Creek area and there is CBNG exploratory drilling along the Fremont/Sweetwater county line; any substantial new oil and gas development would likely occur along the county line.

Wind-energy development is likely to occur in the Great Divide Basin, 99,685 acres of which have high wind-energy potential. Industrial wind-energy development (as opposed to the smaller structures utilized in the livestock grazing program), involve extensive surface disturbance, including roads, pads, and transmission lines. As with any type of surface disturbance, wind-energy development has the potential to adversely impact water quality if not properly mitigated by the application of storm water discharge management.

4.10.4. Cumulative Impacts to Riparian-Wetland Areas from Management Actions

Cumulative Impact Assessment Area

The CIAA used to analyze cumulative impacts to riparian-wetland resources extends outside the planning area, following the fourth-order watershed or HUC) boundaries. The CIAA is comprised of fourth-order watersheds that completely or partially overlap the planning area. Fourth-order watersheds were used as the basic unit of analysis because the scope of cumulative influence from the final RMP and land use plans for planning areas adjacent to the planning area is not expected to have a hydrologic influence beyond this scale.

Analysis of Cumulative Impacts

As with water resources in general, adverse impacts to riparian-wetland systems are a product of surface-disturbing activities associated with mineral resource development, motorized vehicle use, road construction, and agricultural land uses. These activities lead to increases in runoff and sedimentation into riparian-wetland areas. Surface-disturbing activities such as mineral development and road construction impact localized areas of riparian-wetland systems, removing vegetation, compacting hydric soils, and creating a vector for runoff and INNS establishment.

Private agricultural lands that are grazed or irrigated with water from adjacent stream systems can adversely impact riparian-wetland health. A large portion of the local riparian-wetland areas are on private lands. Livestock grazing can result in a direct adverse impact to riparian-wetland areas through the removal of vegetation, compaction of riparian-wetland soils, and reduction of bank stability. If prolonged, this activity can lead to a change in plant community that will not support riparian-wetland health and will create a non-functioning system as riparian-wetland-obligate species are replaced by upland species and more salt-tolerant communities. The cumulative impacts to riparian-wetland systems from these activities would vary widely, not only by alternative, but by the individual watershed in which these activities occur. The following paragraphs describe cumulative impacts for each fourth-order watershed.

The Upper Wind River watershed is primarily in the Dubois area, but extends through the WRIR, ending in the vicinity of the Riverton Dome East oilfield. This watershed is comprised of approximately 1,630,991 acres and is entirely encompassed within the planning area boundaries. Only 4 percent of these acres are BLM-administered lands. As mentioned in the cumulative impacts to water section above, the Shoshone National Forest and WRIR own most of the land in this watershed. Cumulative impacts to riparian-wetland resources in the upper reaches of this watershed would result primarily from timber harvest, wildfire, and livestock grazing on these lands. Activities such as timber harvesting and wildfire can often result in adverse impacts due to movement of sediments into riparian-wetland systems.

Historically, the Shoshone National Forest has performed approximately 12,000 acres of vegetative treatments, including mechanical treatments, timber sales, and prescribed fire; however, the level of sediment movement associated with these activities cannot be quantified at this time. The adverse impacts from Dubois and the surrounding agricultural areas discussed in the water section also apply to the riparian-wetland systems in the area. Impacts include loss of available water to support riparian-wetland-obligate species, sediment, soil amendments (fertilizers), and pesticides. Introduction of INNS can impact water infiltration rates and water holding capacity, which adversely impacts riparian-wetland health.

Impacts to riparian-wetland systems on the WRIR would be the same as discussed above in the water section.

Oil and gas development occurs in localized areas in the Sheldon Dome, Northwest Sheldon Dome, Steamboat Butte, Riverton Dome East, Indian Butte, and Alkali Butte oil and gas fields. The surface disturbance associated with the development of these fields contributes cumulatively to the total amount of bare ground, increasing soil compaction, runoff, and sedimentation into riparian-wetland systems. However, these fields are older, highly developed, and do not generate a large amount of new disturbance. A number of these fields have permits to discharge produced water to the surface, contributing to increased salinity and water volumes in this watershed. The cumulative impacts to riparian-wetland resources in the Upper Wind River watershed could be reduced to some degree under Alternative B due to the closure of this area to mineral development; however, given the small percentage of land influenced by the management actions in the Lander RMP, variability between alternatives is not expected to affect the watershed.

The Badwater watershed is east of Boysen Reservoir from Highway 20 extending east toward Arminto, Wyoming. The watershed is 548,466 acres, and 59 percent is within the boundaries of the planning area. The largest landowners in this watershed are the BLM (56 percent) (18 percent outside the planning area) and private landowners (32 percent) (17 percent outside of the planning area). Cumulative impacts to riparian-wetland resources in this watershed are heavily influenced by oil and gas development.

The Badwater watershed is an area with high potential for oil and gas and has historically been an area of intense development in the planning area. Oil and gas development occurs primarily in the Madden Deep, Iron Horse, and Gun Barrel units. The Gun Barrel unit splits the boundary between the Badwater and Lower Wind River watersheds; however, most of the unit is in the Badwater watershed.

The total level of development, including BLM, is expected to continue. There are approximately 1,400 wells proposed in the area over the next 10 years. See Appendix T (p. 1535) for information on surface disturbance associated with private and state lands. The existing development plays a role in the high level of bare ground and soil compaction, contributing to adverse impacts to riparian-wetland areas in the form of increased overland flow and sedimentation. All three units have permits to discharge produced water to surface; most of the water discharged is produced in the Gun Barrel unit. This produced water contributes to sediment movement into riparian-wetland resources in this watershed. Furthermore, it introduces hydrocarbons, heavy metals, VOCs, and high levels of sodium, all of which can change the existing plant communities and soil chemistry, adversely impacting riparian-wetland health.

Private land ownership also has a heavy influence on riparian-wetland impacts due to the close correlation and proximity of private land and riparian-wetlands. In particular, the lands around the Lost Cabin area in this watershed are a high potential source of INNS seed that can be introduced into riparian-wetland systems.

This watershed has had few active mining claims in recent years; however, the AML program has been active in cleaning up historical mines in the northern reaches of this watershed.

Livestock grazing occurs on most of the lands in this watershed, including state and private lands, adversely impacting riparian-wetland resources in localized areas. However, the impacts from livestock grazing are not as noteworthy in this watershed as those from oil and gas development.

Cumulative impacts to riparian-wetland resources in the Badwater watershed would be substantially less under Alternative B than under the other alternatives as a result of greater restrictions on slope disturbances, restrictions on surface water discharges, livestock utilization levels, wildlife and special status species restrictions, and increases in riparian-wetland buffers. Cumulative impacts to riparian-wetland resources would not vary in the Badwater watershed from management actions under alternatives A and C. Alternative D would provide more protections to riparian-wetland resources through greater restrictions on livestock utilization in riparian-wetland areas, than alternatives A and C, which would result in fewer livestock-related cumulative adverse impacts. Most of the Badwater watershed is considered a DDA, which results in the potential for fewer restrictions on oil and gas development and management of riparian-wetland areas more similar to Alternative C. Alternative D places greater restrictions on surface discharge of produced water than alternatives A and C, but would not protect riparian-wetland resources as well as Alternative B. There is a potential under Alternative D for riparian-wetland buffers to be reduced below 500 feet if it can be shown that impacts could be properly mitigated. It is expected that with reduced buffers and restrictions on surface-disturbing activities that Alternative D would result in higher levels of sedimentation in riparian-wetland areas than alternatives A and B. Cumulative impacts to riparian-wetland resources in the Badwater watershed would be lowest under Alternative B, followed by alternatives A, D, and C.

The Little Wind River watershed is in the southern end of the WRIR, running from the base of the Wind River Range east to the Beaver Creek oilfield and south along Beaver Creek up to the South Pass area, and is comprised of approximately 713,900 acres, all of which are within the boundaries of the planning area. The majority landowners in this watershed are the WRIR (42 percent), private landowners (27 percent), and the BLM (25 percent). Cumulative impacts to riparian-wetland resources in this watershed are primarily influenced by agricultural land use and oil and gas development.

The upper reaches of this watershed along the Little Wind River on the WRIR and Beaver Creek are primarily private lands used for agricultural production. These irrigated lands contribute to reductions in in-stream flow, adversely impacting riparian-wetland resources. As described above, agricultural lands contribute to the return flow of irrigation water into riparian-wetland areas, carrying sediments, soil amendments, pesticides, and INNS seed and contributing to riparian-wetland degradation. In addition, the development of housing in these areas contributes to increases in runoff and sedimentation into riparian-wetland systems, although these developments are much smaller than the subdivisions in Dubois and Lander described above.

Oil and gas development primarily occurs in the Riverton Dome and Beaver Creek oilfields. Historically, these fields have produced oil, but now are being developed to produce CBNG. The RFD for both fields is expected to be approximately 550 wells over the next 10 years. Both fields contribute to a high degree of bare ground and contribute produced water discharge into Beaver Creek.

The South Pass area of this watershed has historically been mined for gold. The mining activities have lead to disturbed ground and introduction of chemicals, including mercury, into the riparian-wetland systems. These impacts were discussed above under water quality. The level of current development is lower than it has been historically; however, recreational gold prospecting still occurs.

Cumulative impacts to riparian-wetland resources in the Little Wind River watershed would be largely driven by management actions on the WRIR and actions on private lands. Surface-disturbing activities and livestock grazing would be restricted on BLM-administered lands to a much greater degree under Alternative B, benefitting riparian-wetland resources along the Beaver Creek drainage system. Alternative D is expected to provide additional protections to riparian-wetland resources from livestock grazing over alternatives A and C. However the Beaver Creek oilfield is in a DDA, which could result in fewer restrictions on surface-disturbing activities related to oil and gas development. Because the Beaver Creek oilfield is an area that represents some of the highest levels of surface-disturbing activities in the Little Wind River watershed, the continued development of this field is expected to continue to contribute to the cumulative adverse impacts to this watershed. Cumulative impacts to this watershed related to mineral development are not expected to vary by alternative.

The Popo Agie watershed is primarily in the Lander Slope and South Pass areas. This watershed is comprised of approximately 514,184 acres, 99 percent of which is within the planning area boundaries. The majority landowners in this watershed are the Shoshone National Forest (38 percent, 1 percent outside of the planning area boundaries), private landowners (26 percent), and the BLM (25 percent). Cumulative impacts to riparian-wetland resources in this watershed are primarily the result of rural development on the Lander Slope and agricultural land use around the town of Lander. Most of the lands in the Shoshone National Forest in this watershed are wilderness, which prohibits much of the surface-disturbing activities encountered throughout the planning area, such as timber harvesting and mineral development. Surface disturbance occurs as a result of recreational activities in the form of primitive campsites and hiking and pack trails.

Rural development of private lands on the Lander Slope contributes to the level of bare ground. The town of Lander and the surrounding agricultural areas contribute to a high degree of accelerated runoff and irrigation return flow, much of which flows directly into the riparian-wetland systems in the area. A large portion of this watershed is private land used for agricultural commodity production. Private land, in particular irrigated fields, in this watershed are a high potential source of INNS seed that can be introduced into riparian-wetland systems.

Oil and gas development is minimal in this watershed, but occurs in localized areas in the Lander, Dallas Dome, and Derby Dome oilfields. The surface disturbance associated with the development of these fields contributes cumulatively to the total amount of bare ground. These fields are older, highly developed, and do not generate a large amount of new disturbance. A number of these fields have permits to discharge produced water to the surface, contributing to increased salinity and water volumes in this watershed. The cumulative impacts to riparian-wetland resources in the Popo Agie watershed are not expected to vary substantially by alternative.

The Muskrat watershed is in the area south of Shoshone, Wyoming, to Beaver Rim and east almost to the Natrona County border. This watershed is comprised of approximately 471,031 acres, all of which is within the planning area boundaries. The majority landowner in this watershed is the BLM (82 percent), followed by private landowners (10 percent), and the State of Wyoming (7 percent). Cumulative impacts to riparian-wetland resources in this watershed are influenced primarily by livestock grazing and mining activities in the Gas Hills area.

Unlike most of the other watersheds in the planning area, most riparian-wetland areas in this watershed are on BLM-administered lands and are affected by historic and current livestock grazing. Improper livestock grazing management adversely impacts riparian-wetlands through the removal of vegetation, soil compaction, and destruction of bank stability. Soil compaction and the removal of vegetation can change the plant community to a more grazing-resistant community or upland plant community, adversely impacting riparian-wetland health.

Historical uranium production has resulted in very large areas of soil disturbance. There is very little active mining in the Gas Hills, and most of the ground disturbance has been reclaimed or is making progress toward successful reclamation.

Oil and gas development primarily occurs in the Fuller oilfield, and is primarily older development contributing to a localized increase in bare ground and produced-water discharge. This produced water contributes substantially to sediment movement into riparian-wetland resources in this watershed. There is some new natural gas, but there are currently no plans for expanded development in this field.

Cumulative impacts to riparian-wetland resources in the Muskrat watershed would be substantially less under Alternative B than under the other alternatives as a result of greater restrictions on livestock grazing in riparian-wetland areas, slope disturbances, surface water discharge restrictions, wildlife and special status species restrictions, and increases in riparian-wetland buffers. Cumulative impacts to riparian-wetland resources would not vary in the Muskrat watershed from the management actions under alternatives A and C. Alternative D provides better protections to riparian-wetland resources resulting from greater restrictions on livestock utilization in riparian-wetland areas than alternatives A and C, which would result in fewer livestock-related cumulative adverse impacts. However, the eastern portions of the watershed historically mined are considered a DDA, which results in the potential for fewer restrictions on oil and gas development and management of riparian-wetland areas more similar to Alternative C. Alternative D places greater restrictions on surface discharge of produced water than alternatives A and C, but would not protect riparian-wetland resources as well as Alternative B. There is the potential under Alternative D for riparian-wetland buffers to be reduced to less than 500 feet in the DDAs if it can be shown that impacts could be properly mitigated. However, the BLM does not expect substantial mineral development in this watershed; therefore, the riparian-wetland buffers would be sufficient to mitigate adverse impacts resulting from such activities. Cumulative impacts to riparian-wetland resources in the Muskrat watershed would be lowest under Alternative B, followed by alternatives D, A, and C.

The Sweetwater River watershed is one of the largest watersheds in the planning area; it spans the southern boundary of the planning area from South Pass east to Pathfinder Reservoir and from Beaver Rim south to Green Mountain. This watershed is comprised of approximately 1,858,374 acres, of which approximately 76 percent is within the boundaries of the planning area. The majority landowner in this watershed is the BLM (75 percent, 16 percent outside the planning area boundaries), followed by private landowners (13 percent, 3 percent outside the planning area boundaries), and the State of Wyoming (8 percent, 2 percent outside the planning area boundaries). Much like the Muskrat watershed, cumulative impacts to riparian-wetland resources in the Sweetwater River watershed are influenced primarily by livestock grazing and mining activities around Jeffrey City, Wyoming. Most of the riparian-wetland areas in this watershed are on BLM-administered lands; however, the riparian-wetland areas around the Sweetwater River are primarily owned by private landowners.

Riparian-wetland areas in this watershed are affected primarily by historic and current livestock grazing. Improper livestock grazing management adversely impacts riparian-wetlands through the removal of vegetation, soil compaction, and destruction of bank stability. Soil compaction and the removal of vegetation can change the plant community to a more grazing-resistant community or upland plant community, adversely impacting riparian-wetland health.

Historic uranium production has resulted in large areas of soil disturbance. There have also been a number of new uranium prospects with the potential to adversely impact riparian-wetland resources. Most new uranium prospects are for in situ leach production, which reduces surface disturbance compared to open-pit mining. These development are similar to an oil and gas field, and would result in similar impacts to riparian-wetland resources.

Oil and gas development primarily occurs in the Bison Basin, Happy Springs, and Crooks Gap oilfields, and is primarily older development contributing to a localized increase in bare ground.

There has been some new oil development in the Bison Basin oilfield, and there is the potential for expanded development of this field.

Cumulative impacts to riparian-wetland resources from surface-disturbing activities such as mineral development in the Sweetwater River watershed would not vary substantially by alternative. Under alternatives A, B, and D, this watershed is largely protected by a series of ACECs, WSAs, wildlife and special status species restrictions, and VRM restrictions for trail protections. The overlapping restrictions would result in cumulative beneficial impacts to riparian-wetland resources. Alternative B would best moderate adverse impacts to riparian-wetlands from non-BLM activities as a result of greater restrictions on livestock utilization in riparian-wetland areas, slope disturbances, surface water discharge restrictions, wildlife and special status species restrictions, and increases in riparian-wetland buffers. Cumulative impacts to riparian-wetland resources would not vary in the Sweetwater River watershed from the management actions under alternatives A and C. Alternative D better protects riparian-wetland resources due to greater restrictions on livestock utilization in riparian-wetland areas than alternatives A and C, which would result in fewer cumulative adverse impacts. Cumulative impacts to riparian-wetland resources in the Sweetwater River watershed would be lowest under Alternative B, followed by alternatives D, A, and C.

The Upper Bighorn, Nowood, Middle North Platte, and Great Divide Basin watersheds are all on the edges of the planning area. These four watersheds are comprised of approximately 8.2 million acres combined; however, only approximately 5 percent of this acreage is in the planning area. Cumulative impacts in these watersheds are influenced very little by the management actions of the planning area. However, in the Great Divide Closed Basin, uranium development south of Green Mountain will contribute to cumulative adverse impacts to riparian-wetland resources. The ongoing exploration for uranium in this area, combined with the future prospects and the development activities in the Rawlins planning area will contribute to increases in ground disturbance in this area. The increases in ground-disturbing activities will increase overland flow and sedimentation into riparian-wetland areas in this watershed. Cumulative impacts to riparian-wetland resources in these watersheds could be reduced to some degree under Alternative B due to the increased restrictions on livestock utilization in and mineral development in riparian-wetland areas; however, given the small percentage of land influenced by the management actions in the Lander RMP, the variability among alternatives is not expected to be substantial. Cumulative impacts to riparian-wetland resources in these watersheds will primarily be driven by the management actions identified in the Bighorn Basin RMP, Casper RMP, and Rawlins RMP.

4.10.5. Cumulative Impacts to Vegetative Communities from Surface-Disturbing Activities and Other Management Actions

Cumulative Impact Assessment Area

Upland Vegetation

The CIAA for upland vegetation is the planning area. Upland vegetation includes grasslands, sagebrush, desert shrubs, and saltbush-greasewood flats, and mountain shrubs, as described in Chapter 3. This area was used as the area of analysis because impacts from management actions proposed under the RMP and other existing plans are not expected to have a cumulative influence beyond this scale.

Forests and Woodlands

The CIAA used to analyze cumulative impacts to forests and woodlands extends throughout the planning area, inclusive of the South Zone of the Shoshone National Forest because these correspond to the fourth-order HUC watershed level discussed for riparian-wetlands. Cumulative impacts at this level mirror and are indicative of impacts at the much larger Central Rocky Mountain region scale in terms of contemporary impacts from forests and woodlands management.

Analysis of Cumulative Impacts

Assumptions used in this cumulative impact analysis for vegetation include:

- Surface disturbance resulting in removal of vegetation has a net adverse impact on upland vegetation.

Upland Vegetation

Past and present actions that affect and have affected vegetative resources include livestock grazing, recreational uses (primarily OHVs), mineral and energy exploration and development, woodland harvest, and vegetative treatments (including those for fire management) on adjacent WRIR, private, State of Wyoming lands, and non-BLM federal lands (Bureau of Reclamation) immediately adjacent to and within the planning area. These actions, described above and in Chapter 3, include disturbances associated with drilling, building access roads, and placement of pipelines.

The projected acres of surface disturbance associated with reasonably foreseeable actions on non-BLM-administered lands in the planning area are provided in Appendix T (p. 1535). This projection understates adverse impacts because the BLM cannot forecast private activities. As indicated above for water resources cumulative impacts, subdivision of private lands and mineral development fluctuates with economic and other factors. As non-BLM development occurs, it magnifies trends resulting from BLM actions.

The spatial layout of oil and gas and energy facilities disturbs a large proportion of vegetation when considered across the planning area. Each disturbed area for a well pad increases the opportunity for INNS invasions and disrupts the spatial continuity of vegetative communities. Past, present, and future surface disturbance from oil and gas development is expected to be highest in the Gunbarrel-Madden-Ironhorse, Beaver Creek, and Bison Basin units.

Past vegetative treatments and wildfire have resulted in beneficial impacts to upland vegetation. Vegetative treatments result in short-term impacts to vegetation by decreasing vegetation production and increasing establishment of early successional species. In the long term, vegetative treatments increase available forage and water for livestock and wildlife populations (for use by private operators) in these areas.

Past fire suppression has contributed to increasing juniper encroachment in the planning area and to a concurrent decrease in aspen communities. Juniper encroachment adversely impacts upland vegetation communities by transitioning the ecosystem structure and decreasing the overall acreage of upland vegetation.

Incremental increases in actual use of BLM grazing permits and leases will continue to occur, as permittees build their herds in response to the cattle cycle and beef prices. This cyclic spike in actual use could adversely impact vegetation condition over the long term.

Lands with well-maintained range improvements adjacent to the planning area increase available forage and water for livestock and wildlife populations (for use by private operators) in these areas. This improves distribution of livestock and wildlife, improving vegetation condition on BLM-administered lands. These incremental beneficial impacts result in healthier vegetative communities that are more capable of retaining moisture and nutrients and resisting disease, INNS invasion, drought, and other natural disturbances and stressors.

Lands with seasonal or yearlong grazing and unmaintained or nonexistent range improvements experience decreased health of vegetative communities. Unhealthy vegetation is incapable of retaining moisture and nutrients and resisting disease, INNS invasion, drought, and other natural disturbances and stressors.

Motorized recreation adversely impacts vegetation. Cross-country OHV use destroys vegetation as tires travel over the ground surface. Repeated passes by motorized vehicles removes vegetation in vehicle tracks. Unwashed tires can transport INNS seeds, and roads historically have been source locations for INNS populations. Localized impacts can be quite severe, but across the CIAA, impacts from motorized recreation are negligible.

Subdivision and agricultural development adversely impact upland vegetative communities. Not only do these activities often remove native vegetation, there is an increased need for water to support this development. It also continues to impact the continuity of vegetation on a landscape basis. Special status plant species, under the ESA and Wyoming BLM sensitive species guidance, are protected on federal lands by exclusion or avoidance of all surface-disturbing activities. Protection of these species and other natural resources on private and state lands might not occur, resulting in adverse impacts to these species and resources.

The CIAA has historically experienced substantial proliferation of INNS into areas considered weed free, and a substantial increase would occur in INNS where they already exist. Integrated INNS management reduces the spread and potential for INNS establishment. Private lands are not subject to the same INNS control measures as public lands; therefore, infestations are generally not treated as rapidly and thoroughly as infestations on public land.

The alternatives vary in their protections for vegetative resources. Alternative B and then Alternative D have the most limitations on development and would result in the fewest adverse impacts to vegetation and the least contributions to cumulative adverse impacts. However, alternatives A and C do not adopt the Core Area strategy or implement it on a case-by-case basis, and would result in more adverse impacts than alternatives B and D. Therefore, alternatives A and C would contribute more to cumulative adverse impacts to vegetative resources.

Under Alternative D, protections for greater sage-grouse habitat under the Core Area strategy would also protect upland vegetation from permitted discretionary actions. To the extent that non-Core Area is managed with fewer greater sage-grouse protections, it is likely that vegetation in those areas will be more adversely affected. As discussed for cumulative impacts to greater sage-grouse, management under the Executive Order and the IM will likely result in more development of private lands not managed in accordance with the Core Area strategy. The cumulative impact of these actions will exacerbate the adverse impacts of BLM actions with a multiplier sort of effect.

The cumulative impacts to vegetation from activities for all resources is projected to be moderate in the short term. It is not anticipated that BLM management actions will cause measurable changes to the vegetation disturbance occurring on non-BLM-administered lands. Therefore, Alternative B would protect the most vegetative resources and Alternative C would result in the greatest cumulative adverse impacts to vegetation.

Over the long term, BLM activities would improve vegetation composition through vegetative fire and fuels treatments and comprehensive grazing strategies. Over the short term, these activities would adversely impact vegetation by reducing the forage base, thereby increasing wildlife and livestock grazing on existing vegetative resources. Furthermore, the displacement of wildlife and livestock associated with surface-disturbing and other disruptive activities would serve to increase grazing on undisturbed vegetative resources. Surface disturbance would increase the proliferation of INNS, which would increase the need for weed-control activities.

Long-term impacts would include increased production and diversity of vegetative communities.

The degree of impacts to vegetative communities would depend on the timing of activities and whether the amount of activity in the CIAA outpaces successful reclamation and revegetation efforts in disturbed areas. The implementation of BLM reclamation and mitigation guidelines, best comprehensive grazing strategies, and restrictions on surface use would help reduce overall impacts. However, given the level of anticipated mineral development and the fact that most of the native shrub communities (e.g., sagebrush) require more than 20 years to reestablish to predisturbance conditions, surface disturbance impacts are expected under all alternatives, with alternatives A and C resulting in the greatest adverse impacts to plant communities. Impacts under alternatives B and D would be similar, but less adverse. Development activities under all the alternatives would result in the removal of unique attributes of vegetative communities and would reduce the ability of vegetative resources to support other resource values.

Forests and Woodlands

Chapter 3 describes the impacts to forest and woodland resources from past actions in the planning area. Notable past actions include an active commercial logging program from the early 20th Century through the early 1990s on Green Mountain, in the South Pass area, and on USFS and private lands in the Dubois area. In these areas, the mixture of age-class structure is still noticeable, specifically in the Green Mountain area. This landscape-level age-class mixture is less noticeable in the South Pass and Dubois areas. Acres of historically logged forestlands in the CIAA are minor compared to acres that have had some type of silviculture treatment in the past.

The prominence of even-aged stands 100 to 200 years old across the CIAA that are nearing the historic fire return interval in this area, combined with continued fire suppression throughout most of the 20th Century to the present, has resulted in forested areas dominated by lodgepole pine that are fully mature and more susceptible to insect and disease outbreaks. This is evident with the bark beetle outbreak that has heavily affected the northern portion of the CIAA and is anticipated to substantially affect the southern portion of the CIAA over the coming years. Of the 1.3 million forested acres in the Shoshone National Forest, approximately 823,000 acres, or 63 percent, of the forest are affected by bark beetles. Likewise, acreage of mountain pine beetle, Douglas fir beetle, and other bark beetles on the WRIR are similar in their extent. Of the 170,000 forested cover types acres on the WRIR, 120,000 acres (70 percent) are affected by bark beetles.

Fire in woodland areas over the past 15 years has altered specific portions of the CIAA, but alteration has not been widespread due to active fire suppression and changes in many portions of the historic landscape, and contemporary resource uses and public infrastructure that have altered the natural landscape. Conifer woodlands have also increased in acreage due to fire suppression strategies and contemporary resource uses. Deciduous woodlands have decreased for the same reasons.

Development in the WUI has not been substantial in terms of acreage in forest and woodland areas throughout the CIAA. However, development in the past on private lands adjacent to BLM-administered lands has made management of BLM forests and woodlands both more critical and challenging to implement.

The significance of widespread bark beetle outbreaks in forest and woodland areas has led to extensive die-off of trees and removal of dead and dying trees in the WUI. This is specific to the Wind River Range, specifically the Dubois area, and increasingly in the Lander Slope and South Pass areas. Green Mountain has not experienced the same landscape-level insect and disease outbreaks. The removal of trees is concentrated on treating priority areas, and is minor in relation to the entire forested landscape. The priority of tree removal is for protecting WUI communities and infrastructure from increased fire danger associated with stands of dead trees.

Mechanical treatments of woodland communities is ongoing throughout the CIAA and results in a net loss of woodland acreage, but that loss is minor compared to existing woodland communities. Similarly, the harvesting of over-the-counter and commercial wood products is ongoing, but the harvest is sustainable and minor compared to the maintenance of areas that are not harvested.

It is anticipated that management of forest and woodland stands will continue the pattern of the last 15 years. Increased loss of forested stands will lead to stand management that could include more extensive use of wildland fire in areas where it is allowed to burn without threatening human health and safety. Increased mechanical treatments of forest stands are also anticipated and will serve to restore forested communities where fire is not a viable option. The primary impacts to forested areas in the planning area will come from actions of the USFS on the Shoshone National Forest, the Bureau of Indian Affairs (BIA) on the WRIR, and private landowners in the Dubois and South Pass areas. Limits on the use of prescribed fire and the use of wildland fire in woodland and forested areas due to increased public and private infrastructure and WUI will restrict management options in many areas. Increased infrastructure and disturbance due to mineral development in woodland areas will be minimal across the CIAA, but will likewise limit the use of fire in certain forested areas due to prohibitive complexity and liability associated with the use of natural processes such as fire.

Woodland health treatments will continue so as to restore juniper and limber pine woodlands and aspen communities. Mechanical treatments and prescribed fire will be used across the CIAA to achieve multiple resource benefits. Although prescribed fire will continue in these areas, annual livestock use of areas will continue to limit the use of fire in many woodland areas.

Protections for threatened and endangered and sensitive species will limit management options across the CIAA and potentially restrict certain forest and woodland treatments so as to maintain habitat conditions suitable for wildlife species and protect habitat qualities associated with vegetation species such as five-needle pines. While private landowners do not have the same requirements with regard to sensitive species as federal agencies, the threatened and endangered status of grizzly bears and the lynx populations in the Dubois area will apply to all landowners including in the Shoshone National Forest.

Over-the-counter and commercial wood product sales and removal is expected to continue in the CIAA, but it will be minor in relation to forest and woodland stands that do not have any product removal. The cumulative impacts in forested and woodland communities will be an increase in early seral vegetative conditions that will be minor compared to the continued dominance of late seral forest and woodland conditions.

The actions of the USFS and the BIA will drive most impacts to forest and woodlands in the CIAA. BLM management has little impact on forests in the CIAA. Pine beetle and other pests are adversely impacting forest resources to the point that certain pine species have become BLM sensitive species (limber pine) and have resulted in the re-listing of the grizzly bear under the ESA. There would be virtually no difference in impacts among the alternatives regarding forest management. Consequently, the cumulative impacts of non-BLM actions, while potentially overwhelmingly adverse to forest resources, similarly would not vary by alternative.

Alternatives C and D provide the most potential benefit, cumulatively, to forest resources because both allow active silviculture techniques. Alternative D provides management that could most easily work cooperatively with the USFS and could maximize synergistic management. However, funding is expected to decrease, and with no commercial market likely to develop, the alternatives would result in similar cumulative impacts.

4.10.6. Cumulative Impacts to the Continental Divide National Scenic Trail from Development Activities

Cumulative Impact Assessment Area

The cumulative impact area of analysis for the CDNST includes the foreground/middleground zone (0 to 5 miles either side) of the trail within the Wyoming Basin ecoregion (Map 139).

> The Wyoming Basin Ecoregion is a broad arid intermontane basin interrupted by hills and low mountains and dominated by grasslands and shrublands. Nearly surrounded by forest-covered mountains, the region is drier than the Northwestern Great Plains (43) to the northeast and does not have the extensive cover of pinyon-juniper woodland found in the Colorado Plateaus (20) to the south. Much of the region is used for livestock grazing, although many areas lack sufficient forage to support this activity. The region contains major natural gas and petroleum producing fields. The Wyoming Basin also has extensive coal deposits along with areas of trona, bentonite, clay, and uranium mining (EPA 2009e).

The CIAA was chosen because it represents a distinct visual and recreational opportunity along the CDNST; therefore, this area marks a unique contribution to the trail system as a whole. Such areas are vitally important to the trail purpose as emphasized in the Bureau of Outdoor Recreation study commissioned by the enabling legislation of the CDNST (Bureau of Outdoor Recreation 1976):

> The primary purpose of this trail would be to provide a continuous, appealing trail route, designed for the hiker and horseman, but compatible with other land uses…[and] to provide hiking and horseback access to those lands where man's impact on the environment has not been adverse to a substantial degree and where the environment remains relatively unaltered. Therefore, the protection of the land resource must remain a paramount consideration in establishing and managing the trail. There must be sufficient environmental controls to assure that the values for which the trail is established are not jeopardized…. The basic goal of the trail is to provide the hiker and rider an entrée to the diverse country along the Continental

> Divide in a manner which will assure a high quality recreation experience while maintaining a constant respect for the natural environment.

Typical stressors contributing to potential cumulative impacts to the CDNST include man-made intrusions into the viewshed and changes to the recreation environment. Man-made intrusions into the viewshed, occurring primarily on BLM public land, occur as a result of actions to support resource uses such as oil and gas development, wind-energy development, and ROW corridors. Changes to the recreation environment that cause the area to move toward a more urban environment include increases in motorized access and use, decreased naturalness, increased facilities, and increased contacts with people and groups. Typically these changes result from the same activities documented above, but can also result from actions in the recreation program (i.e., a new facility is developed to support a motorized vehicle play area in the trail corridor).

For analysis purposes, the CDNST in the Wyoming Basin has three distinct parts. These analysis units were developed based on homogeneity in land ownership pattern, level of development (existing and projected), and landscape characteristics (the form, line, color, and texture of land, vegetation, water, and structures). The three distinct parts of the CDNST through the Wyoming Basin are the Checkerboard Region, the Bairoil Region, and the Antelope Hills Region.

The Checkerboard Region encompasses the area from the point where the CDNST intersects the Wyoming Basin/Southern Rockies ecoregion division north to the point where the CDNST meets Mineral Exploration Road. This section of trail (approximately 54 miles) is in the Rawlins planning area and intersects a region known as the checkerboard. This region has mixed public and private lands that resemble the pattern on the board game. In this region, BLM management is limited due to the large amount of private lands within the trail viewshed and the lack of blocked areas of public land. Protections on this section of trail include a 1/8 mile CSU on either side of the trail to maintain human health and safety; this prescription is applied only on BLM-administered lands. Impacts to the Checkerboard Region are not expected to vary under the alternatives because the entire segment is located outside of the planning area.

The Checkerboard Region of the CDNST is under intense pressure from resource uses, including energy development associated with wind and natural gas. Projects underway that will be within view and influence the character of the CDNST in this area include the Atlantic Rim Gas Development and the Choke Cherry/Sierra Madre wind-energy development. It is also reasonable to assume that the area's high wind-energy potential will continue to attract new wind-energy developments in the CDNST corridor, and further justified by the fact that the entire trail in this region is currently within a project area with an approved meteorological tower (wind testing tower) ROW. As a result, it is projected that within the next 20 years, users of this portion of the CDNST will be constantly viewing man-made visual intrusions associated with energy development and transmission (Smith 2010).

The Bairoil Region encompasses the area of the CDNST from Mineral Exploration Road to the Happy Springs oilfield. This section of trail (approximately 42 miles, 16 of which are in the planning area) is heavily developed and affected by transmission corridors, oil and gas development, and uranium mining. The Rawlins RMP applies a 1/8-mile buffer on both sides of the trail to protect human health and safety.

It is projected that over the next 20 years this portion of the CDNST will continue to experience additional industrial development. Uranium mining in the area has experienced an upward trend, and the area also contains moderate potential for oil and gas. The area also has high wind-energy potential. New impacts to this section of the trail would be less under Alternative B because some of this portion of the trail is closed to leasing because of its overlap with greater sage-grouse Core Area. In addition, alternatives B, C, and D proposes a ¼-mile protective corridor on either side of the planning area portion of this trail. Such a corridor would ensure user safety, but would not provide long-term protections for the visual resources and setting associated with the trail. It is projected that the additive impact of the Rawlins RMP and Lander RMP alternatives A, C, and D would result in the CDNST users intermittently encountering human intrusions along this entire section of the trail.

The Antelope Hills Region encompasses the area of the CDNST from just out of view of the Happy Springs oilfield to the Wyoming Basin/Middle Rocky Mountains ecoregion division. This section of trail (approximately 60 miles, 56 of which are in the planning area) is pristine, with little to no influences from man-made visual intrusions. This portion of trail provides the CDNST visitors with a feeling of solitude while also traveling through a historic area with few modern intrusions. The trail travels along a section of the Seminoe Cutoff of the Oregon/California NHTs. The modifications that do exist along this trail are viewed for only a short period, do not strongly contrast from the surrounding landscape, and, in the case of the South Pass Historic site, contribute to the visitors experience.

Existing management of the CDNST in this area is not integrated or targeted to specifically benefit the CDNST. Portions of the trail intersect the Lander Field Office NHT ACEC (¼ mile either side of the NHT) and South Pass Historic Mining Area ACEC, as well as the Rock Springs Field Office Wind River Slope SRMA and South Pass ACEC. As a result, the CDNST in the Rock Springs planning area is not projected to have new visual intrusions into the viewshed. Alternative A will allow for new visual intrusions into the viewshed of the CDNST, especially in the regions east of the South Pass ACEC. These intrusions will primarily result from wind-energy development and can be anticipated across 49 miles of this section of the CDNST. New visual intrusions in this region of the Wyoming Basin CDNST would be highest under Alternative C due to increased development that this alternative facilitates. Alternative B provides the most protections for the CDNST in this area, and ensures no new visual intrusions into the trail viewshed. Alternative D is similar to Alternative B, except that under Alternative D, new visual intrusions in the background of the trail viewshed could may be infrequently seen by CDNST users. The background area is outside this CIAA; therefore, impacts to this zone do not factor into the comparison of alternatives.

Table 4.56, “Wyoming Basin CDNST Management Miles by BLM Field Office” (p. 1245) lists each segment and how much of that segment is managed by the various BLM field offices. While the impacts to trail miles from Lander RMP management actions would vary by alternative, potential impacts in the Rawlins and Rock Springs planning areas would not vary. Therefore, impacts from the management detailed in the Rawlins and Rock Springs RMPs will be considered an additive impact to all alternatives. That is, this management actions under this RMP could directly impact 72 miles of the CDNST in the Wyoming Basin. This cumulative impacts analysis also considers the additive impact of actions and decisions along the 77 miles of the Wyoming Basin CDNST in the Rawlins and Rock Springs planning areas.

Table 4.56. Wyoming Basin CDNST Management Miles by BLM Field Office

Segment (Length)	Lander Planning Area, Miles (Percent of Segment)	Rawlins Planning Area, Miles (Percent of Segment)	Rock Springs Planning Area, Miles (Percent of Segment)
Checkerboard (54 Miles)	0	54 (100%)	0
Bairoil (42 Miles)	17 (40%)	25 (60%)	0
Antelope Hills (60 Miles)	58 (97%)	0	2 (3%)
Total (156 Miles)	75 (48%)	79 (51%)	2 (1%)
Source: BLM 2009a BLM Bureau of Land Management CDNST Continental Divide National Scenic Trail			

Analysis of Cumulative Impacts

Actions in the Rawlins and Rock Springs planning areas will not change by alternatives in this document. Actions in the Rawlins planning area and the minimal protections on the CDNST prescribed through the Rawlins RMP will result in 74 miles of the Wyoming Basin CDNST being susceptible to human intrusions and disturbances. CDNST users will see these impacts as they move from the southern Rockies to the Wyoming Basin ecoregion (Map 139). This section of trail will provide users a rural recreation setting. Typically, a rural recreation setting is characterized as having heavy motorized vehicle traffic, reduced naturalness, structures and facilities frequently visible, and a high level of contacts with other people. It is projected that the visual resources along these 74 miles of trail will be dominated by wind turbines, transmission corridors, gas development facilities, and associated roads. Actions in the Rock Springs planning area and the protections for the CDNST delineated in the Rock Springs RMP will prevent visual intrusions on and recreation setting changes on 3 miles of Wyoming Basin CDNST.

Table 4.57, "Number of Miles of Wyoming Basin CDNST Projected to be Impacted by Human Intrusion and Resource Uses" (p. 1245) summarizes the findings.

Table 4.57. Number of Miles of Wyoming Basin CDNST Projected to be Impacted by Human Intrusion and Resource Uses

CDNST Area (Trail Miles)	Alternative A (miles)	Alternative B (miles)	Alternative C (miles)	Alternative D (miles)
Checkerboard (54)	54	54	54	54
Bairoil (42)	42	19	42	42
Antelope Hills (60)	49	0	60	0
Total (149)	139	74	146	90
Source: BLM 2009a CDNST Continental Divide National Scenic Trail				

Alternative A, coupled with management in the Rawlins RMP would result in almost the entire Wyoming Basin CDNST (93 percent of the trail) being converted to a rural recreation setting with numerous visual intrusions. Under this alternative, the CDNST visitor would be within sight of energy developments and utility corridors over almost the entire Wyoming Basin. Users will be constantly on or near improved roads; within view of strongly dominant visual modifications and facilities; in contact with other people; and consistently encountering motorized users. This amount of impact will not allow the Wyoming Basin CDNST to meet the purpose of the trail (as established in the enabling legislation).

As a result of decisions in the Rock Springs RMP and Alternative A, 10 miles of the Wyoming Basin CDNST will be protected from visual intrusions and recreation setting change. This section (from the South Pass ACEC to the Wyoming Basin boundary) would continue to provide users with a middle-country recreation setting. Despite these protections, it is projected that management under Alternative A would cause CDNST users to strongly remember the Wyoming Basin and BLM Wyoming CDNST for the amount of energy development.

Alternative B would result in the least cumulative impact to the Wyoming Basin CDNST. This alternative protects almost 50 percent of the Wyoming Basin CDNST from new development by restricting energy impacts to the Rawlins portion of the CDNST. Under this alternative, the Wyoming Basin CDNST would provide a balanced display of multiple uses and recreation settings. The Rawlins portion would be developed for energy uses and provide a rural recreation setting; the other portions would display wide-open spaces and a middle-country (sometimes back country) recreation setting.

Cumulative impacts under Alternative C would be similar to impacts under Alternative A, except that only the 3 miles of Wyoming Basin CDNST (managed by the Rock Springs Field Office) would display an unchanged visual and recreation resource.

Cumulative impacts under Alternative D would result in 60 percent of the Wyoming Basin CDNST trail affected by human intrusions and development. Importantly, most of this impact would occur in the Checkerboard and Bairoil regions of the Wyoming Basin CDNST. These regions are primarily influenced by the Rawlins RMP or existing human intrusions, and therefore mark an ideal opportunity to provide the user with an opportunity to learn about these resource uses. Therefore, cumulative impacts to the Wyoming Basin CDNST under this alternative would be less than under alternatives A and C, but more than under Alternative B.

Alternative D provides for protections of the more pristine Antelope Hills Region of the CDNST, or almost 40 percent of the CDNST through the Wyoming Basin. This portion of the CDNST would remain unchanged and the recreation setting would continue to provide a middle-country and sometimes back country recreation setting. Cumulative impacts under Alternative D would result in a Wyoming Basin CDNST that is managed in a manner that meets the overall purposes, need, and goal for the CDNST while also allowing for resource uses.

Under all alternatives, this section of the CDNST would continue to experience impacts from similar activities.

4.10.7. Cumulative Impacts to National Historic Trails from Development Activities

Cumulative Impact Assessment Area

For the four Congressionally Designated NHTs (the Oregon, Mormon, California, and Pony Express NHTs), the CIAA is divided into a general assessment area and a specific assessment area (defined below).

General Assessment Area: The general assessment area is defined as the entire length of the four NHTs, which spans from Missouri and Iowa across the west to Oregon and California. This area is used as a general unit of analysis because impacts from actions throughout the United States are expected to have incremental impacts to the NHT system as a whole.

The data used for the analysis of the general assessment area came from the National Park Service 1999 *Comprehensive Management and Use Plan and Update for the Oregon, Mormon Pioneer, California, and Pony Express National Historic Trails* (NPS 1999). That plan identified the routes of the NHTs, generally described the present conditions of the trails, and identified what sections remained. The plan also designated particular remaining segments of the NHTs as "High Potential Segments": those that possess "above average scenic values or affording an opportunity to vicariously share the experience of the original users of a historic route." The entire NHT route in the planning area (more than 90 miles) is part of one of these High Potential Segments, so it can be reasonably compared to other High Potential Segments along the four NHTs. For the analysis of the general assessment area, all High Potential Segments more than 25 miles long were chosen to compare with the NHTs in the planning area.

Specific Assessment Area: The more specific assessment area is defined as the route of the NHTs through Wyoming from Fort Laramie to near the Utah and Idaho state lines. Fort Laramie, in southeastern Wyoming, was chosen because it lies near the beginning of the western high plains, where the land begins to lift toward the slopes of the Rocky Mountains. It was also the place where the pioneers left the easiest part of their westward journey. Once past Fort Laramie, the NHTs pass through the high plains for more 400 miles and cross the Continental Divide. Finally, as the pioneers neared the borders of present-day Utah or Idaho (depending on which trail they were on), they began to encounter the mountains and valleys of the eastern Great Basin and entered the next phase of their journey.

Again, the data used for the analysis of the specific assessment area again came from the National Park Service 1999 *Comprehensive Management and Use Plan and Update for the Oregon, Mormon Pioneer, California, and Pony Express National Historic Trails* (NPS 1999). For this more specific analysis, any High Potential Segment within the western high plains from Fort Laramie to near the Utah or Idaho state lines was chosen to compare with the NHTs in the planning area.

General Assessment Area

Background: The original Oregon, Mormon, California, and Pony Express Trails spanned thousands of miles over the central and western United States. During their heyday, these trails were the primary overland routes for some 500,000 American settlers and fortune seekers traveling west in the mid 1800s. The combined efforts of all of these emigrants helped secure the lands of the far and intermountain west for the United States, and enabled our nation to extend from the Atlantic Ocean to the Pacific Ocean.

The four trails covered more 11,000 miles on their way to Oregon, California, Utah, and points between. First established in the 1840s, these trails were heavily used by emigrants, entrepreneurs, and fortune seekers until around 1870. Afterward, the same trails were mostly used for commerce and more local traffic, and eventually many of these trails were improved, built upon, or even paved. It was not until the 1960s that a widespread appreciation of these historic routes began to develop, and a movement to preserve what was left of them began to build momentum.

In 1968, the National Trails System Act was passed to establish and develop a National Scenic, Historic, and Recreational Trails System across the nation. The Oregon and Mormon Pioneer NHTs, both of which run through the planning area, were the first two NHTs designated through this act. Later, the California and Pony Express trails were designated as NHTs, and these trails also run through the planning area in the same vicinity as the Oregon and Mormon Pioneer trails.

The National Park Service was given the task of identifying the historic routes and remaining vestiges of these four emigrant trails. They found that approximately 25 percent of the original 11,400 miles of the Oregon, Mormon, California, and Pony Express Trails remained intact or somewhat intact. These intact portions range from short pieces of undamaged trail ruts surrounded by modern developments to long stretches of intact or somewhat intact trail. The National Park Service was then asked to identify segments of these NHTs the public could best visit and appreciate. These segments were called High Potential Segments, and the National Park Service put forward recommendations for their management and use.

Some of these High Potential Segments are of very high quality, with long stretches of largely undisturbed trail traces and surrounding landscapes that look much like they did in the mid 1800s. Others have more disturbances on them or are shorter, but still qualify as High Potential Segments because of their recreational potential or their high scenic quality. For this more general portion of the analysis, the BLM has chosen High Potential Segments 25 or more miles long because shorter segments tend to be surrounded by more impacts and have more impediments to useful management. Table 4.58, "High Potential Trail Segments in the General Assessment Area" (p. 1248) lists these High Potential Segments and their qualities.

Table 4.58. High Potential Trail Segments in the General Assessment Area

Segment Name	Segment Location	Length (Miles)	Trail(s)	Number of Associated High Potential Sites	Primary Land Owner/ Manager	Overall Quality		
						Ruts/ Swales	Historic Setting	Combined
South Pass	Central and Western Wyoming	145	Oregon, Mormon, California, Pony Express	8	BLM	Good to excellent	Excellent	Excellent
Big Sandy to Green River	Western Wyoming	50	Oregon, Mormon, California, Pony Express	1	BLM	Fair to good	Good to excellent	Good
Anderson Ridge to Buckskin Crossing	Western Wyoming	27	California	0	BLM	Good to excellent	Excellent	Good to excellent
North Piney Creek to Smiths Fork	Western Wyoming	42	California	0	USFS	Good	Excellent	Good to excellent
Bear River Divide	Western Wyoming	31	Oregon, California	0	BLM	Good to excellent	Excellent	Excellent

Segment Name	Segment Location	Length (Miles)	Trail(s)	Number of Associated High Potential Sites	Primary Land Owner/ Manager	Overall Quality		
						Ruts/ Swales	Historic Setting	Combined
Fort Bridger to Cache Cave	Southwestern Wyoming	44	Mormon, California, Pony Express	3	Private	Good	Fair to good	Good
Castle Rock to This is the Place	Northern Utah	51	Mormon, California, Pony Express	2	Private	Fair	Fair	Fair
Fairfield to Ruby Valley	Western Utah and Eastern Nevada	217	Pony Express	5	BLM	Fair to excellent	Excellent	Good to Excellent
Grantsville to Franklin River	Western Utah and Eastern Nevada	177	California	18	BLM	Good	Good to excellent	Good to excellent
Curlew Valley to Salt Lake Cutoff Jct	Northern Utah and Southern Idaho	45	California	3	Private	Fair to Good	Fair to good	Fair to good
Granite Pass to Humboldt River	Southern Idaho, Northwestern Utah, and Northeastern Nevada	98	California	6	BLM	Fair to excellent	Good to excellent	Good to excellent
Auburn to Wayan	Western Wyoming and Eastern Idaho	25	California	0	USFS	Good	Good	Good
Arbon Valley to Sublett Reservoir	Southern Idaho	25	California	2	BLM and USFS	Good to Excellent	Good to excellent	Good to excellent
Cascade Mountain Crossing	Southern Oregon	30	California	4	BLM and USFS	Good to excellent	Good to excellent	Good to excellent
Overland Canyon to Simpson Park Station	Eastern Nevada	84	Pony Express	0	BLM	Good to excellent	Excellent	Good to excellent
Humboldt Sink to Dayton	Western Nevada	81	California	2	BLM and State of Nevada	Fair	Fair to good	Fair to good
Genoa to Union House	Western Nevada and Eastern California	72	California	15	USFS	Fair	Fair	Fair
Humboldt Sink to Fernley	Western Nevada	37	California	1	BLM and private	Fair	Fair	Fair

Segment Name	Segment Location	Length (Miles)	Trail(s)	Number of Associated High Potential Sites	Primary Land Owner/ Manager	Overall Quality		
						Ruts/ Swales	Historic Setting	Combined
Verdi to Steephollow Crossing	Eastern California	74	California	7	USFS	Fair to good	Fair	Fair
Bucks Summit to Lake Oroville	Eastern California	34	California	0	USFS and private	Fair to Good	Fair	Fair
Lassen Meadows to Pothole Springs	Northwestern Nevada and Northeastern California	206	California	13	BLM and USFS	Excellent	Excellent	Excellent
1856 Nobles Trail Junction to Granite Creek	Western Nevada	30	California	1	BLM	Good	Fair to good	Good
Deep Hole Springs to Smoke Creek Canyon	Western Nevada	26 miles	California	1	BLM	Good	Fair to good	Good
Butte Creek to Manzanita Chute	Eastern California	25	California	1	USFS and National Park Service	Fair to good	Fair to excellent	Good to excellent
Pit River to Feather Lake	Eastern California	46	California	2	USFS	Fair to good	Fair to good	Fair to good
Deer Creek Meadows to Acorn Hollow	Eastern California	46	California	4	USFS and private	Fair to good	Fair to excellent	Fair to good
North Trail	Western Idaho	83	Oregon	8	BLM	Good to Excellent	Good	Good
Barlow Road	Northern Oregon	42	Oregon	6	USFS	Good	Excellent	Good to excellent

Source: NPS 1999

BLM Bureau of Land Management
USFS United States Forest Service

Analysis of Cumulative Impacts – General Assessment Area

As Table 4.58, “High Potential Trail Segments in the General Assessment Area” (p. 1248) shows, most of the best-quality High Potential Segments are on public lands managed by the BLM or the USFS. This is logical, because these agencies have been given the responsibility to manage and protect these NHTs for several decades. Other land managing agencies, such as states or counties, might or might not have trail protection as a priority. Privately owned lands tend to be managed based on other factors, including agricultural, residential, and commercial uses, and long-preserved trails can quickly become threatened if these other uses become dominant. It is generally true that the NHTs are best protected by entities who have laws encouraging protection of trails, and it is also true that entities with other priorities do not tend to protect historic trails as well.

In addition, almost all of the miles of excellent- or good-to-excellent condition High Potential Segments (91 percent) are in just three areas of the west — the plains of central and western Wyoming, the deserts of western Utah and eastern Nevada, and the deserts of northwestern Nevada. Three of these segments (covering more than 245 miles) are in Wyoming; two segments (covering almost 580 miles) are in western Utah/eastern Nevada, and one segment (covering a little more than 200 miles) is in northwestern Nevada.

One of these excellent-condition segments is the South Pass High Potential Segment, and the complete NHT route in the planning area is in this High Potential Segment. The South Pass High Potential Segment begins in the Casper planning area, just east of the Lander planning area, and ends in the Rock Springs planning area near Farson; approximately 90 of the 145 miles of the South Pass High Potential Segment are in the Lander planning area. The South Pass High Potential Segment is equal to or better in quality than any of the other excellent segments in Wyoming, Utah, or Nevada, because it not only has excellent historic settings, it can also be traveled on two-track roads on or near original ruts or swales for most of its length.

Most types of development adversely impact the historical settings of the trails, and commercial wind-energy development is now considered the most adverse. This is due to the very large size of the turbines, the visual impact of which is exacerbated by lighting mandated for aircraft safety, and associated transmission lines that can contrast with the visual and historical setting of the trails, even at a great distance. Pressures to develop wind energy along High Potential Segments are present on the Fairfield-to-Ruby Valley and the Fort Bridger-to-Cache Cave segments (where wind farms have already been permitted), and the Anderson Ridge-to-Buckskin Crossing, North Piney Creek-to-Smiths Fork, Bear River Divide, Curlew Valley-to-Salt Lake Cutoff Junction, Granite Pass to Humboldt River and Barlow Road segments, where high wind-energy potential has been identified. High wind-energy potential has also been identified along the South Pass High Potential Segment; several wind-energy development companies have applied for leases on and around this segment, and several more companies have expressed interest in the area.

Development of transmission line and pipeline developments along the NHTs is also a concern. Segments in southwestern Wyoming, western Utah, Nevada, southern Idaho, and northeastern California have been impacted or are threatened by major utility corridors. The South Pass High Potential Segment is also threatened by transmission line and pipeline development. Since the 1980s, major transmission and/or pipelines have proposed to cross the segment, and these types of proposals are expected to increase in the future.

If development is allowed along a highly pristine NHT segment such as South Pass, then developers will be encouraged to press for development along other high quality segments. Conversely, if development is restricted in order to maintain South Pass Segment's historical settings, then other high quality segment managers could use the same rationales for protection of settings.

Specific Assessment Area

The specific assessment area for NHTs is the route of the NHTs from Fort Laramie to near the Utah and Idaho state lines. This area represents a section of the trails that the emigrants themselves identified; they had just left the easiest part of their journey and had now entered the almost 400-mile long trek across the high plains of Wyoming. The area's geology strongly influenced the path taken because it followed the availability of water and the gradual slopes up to and over the Continental Divide. Finally, as the pioneers neared the borders of present-day Utah or Idaho (depending on which trail they were on), they encountered the mountains and valleys of the eastern Great Basin and entered the next phase of their journey.

The specific assessment area encompasses High Potential Segments in the Casper, Lander, Rock Springs, Pinedale, and Kemmerer planning areas, and the USFS Bridger-Teton National Forest. The assessment area includes the High Potential Segments of Fort Laramie to Warm Springs, Prospect Hill, South Pass, Big Sandy to Green River, Anderson Ridge to Buckskin Crossing, North Piney Creek to Smith's Fork, Bear River Divide, and Fort Bridger to Cache Cave. It does not include the Auburn to Wayan High Potential Segment because this segment is considered to have left the western high plains and is instead on the extreme eastern edge of the Great Basin.

All High Potential Segments, not just those 25 miles and longer, were included in the analysis of the specific assessment area. Table 4.59, "High Potential Trail Segments in the Specific Assessment Area" (p. 1252) lists and describes these segments.

Table 4.59. High Potential Trail Segments in the Specific Assessment Area

Segment Name	Segment Location	Length (Miles)	Trail(s)	Number of Associated High Potential Sites	Primary Land Owner/ Manager	Overall Quality		
						Ruts/ Swales	Historic Setting	Combined
Fort Laramie to Warm Springs	South-eastern Wyoming	14	Oregon, Mormon, California, Pony Express	4	Private	Good to excellent	Fair to good	Good
Prospect Hill	Central Wyoming	3	Oregon, Mormon, California, Pony Express	2	BLM	Fair to good	Fair to good	Fair to good
South Pass	Central and Western Wyoming	145	Oregon, Mormon, California, Pony Express	8	BLM	Good to excellent	Excellent	Excellent
Big Sandy to Green River	Western Wyoming	50	Oregon, Mormon, California, Pony Express	1	BLM	Fair to good	Good to excellent	Good
Anderson Ridge to Buckskin Crossing	Western Wyoming	27	California	0	BLM	Good to excellent	Excellent	Good to excellent
North Piney Creek to Smiths Fork	Western Wyoming	42	California	0	USFS	Good	Excellent	Good to excellent

Segment Name	Segment Location	Length (Miles)	Trail(s)	Number of Associated High Potential Sites	Primary Land Owner/ Manager	Overall Quality		
						Ruts/ Swales	Historic Setting	Combined
Bear River Divide	Western Wyoming	31	Oregon, California	0	BLM	Good to excellent	Excellent	Excellent
Fort Bridger to Cache Cave	South-western Wyoming	44	Mormon, California, Pony Express	3	Private	Fair to good	Fair to good	Good

Source: NPS 1999

BLM Bureau of Land Management
USFS United States Forest Service

Two High Potential Segments are rated as excellent in overall quality — the South Pass Segment and the Bear River Divide Segment. Both of these segments have outstanding historical settings, and the condition of their ruts and swales are mostly quite good. The rest of the High Potential Segments range from: good to excellent (two segments); good (three segments); and fair to good (one segment). Short narratives on each follow:

Fort Laramie to Warm Springs Segment: This 14-mile long segment is predominantly privately owned, with some National Guard- and National Park Service-managed lands. Currently in good condition, this segment is generally classified as range land. However, because it is mostly in private ownership, it is subject to changes in ownership and use, and its good-condition status could change at any time.

Prospect Hill Segment: This 3-mile long segment is predominantly BLM-administered land, but has some state and private lands around it. It is in fair to good condition, and has been affected by pipeline and transmission line development in the past. Recent BLM management decisions should help to reduce impacts to this site by requiring VRM limits out to 3 miles on each side of the segment.

South Pass Segment: This 145-mile long segment is predominantly BLM-administered land, and is in excellent condition. The National Park Service described the South Pass segment in these words: “The first cross-country segment of the Oregon Trail recommended in this report is also one of the very best stretches of the Oregon Trail left in any of the six states through which the trail passes. The South Pass segment, which extends from Independence Rock to just west of Parting of the Ways, contains 125 miles of the most unspoiled terrain over which the Oregon Trail passes” (NPS 1981).” And, “The quality of the resources and the visual experience make South Pass one of the most impressive segments on the entire trail…(NPS 1999).”

As described above, in the 1987 RMP, the planning area section of the South Pass Segment is only minimally protected by BLM management decisions that restrict development within ¼ mile on each side of the trail. On the Rock Springs section of the segment, part is protected by a 3 mile on each side ACEC, and part is protected by a ¼ mile on each side zone.

Big Sandy to Green River Segment: This 50-mile long segment is also mostly BLM-administered, and is in good condition. A paved highway runs along the segment, but the setting is mostly intact. A ¼ mile on each side protection corridor minimally protects this segment.

Anderson Ridge to Buckskin Crossing Segment: This 27-mile long segment is mostly BLM-administered land, and in good to excellent condition. A county road runs over or along approximately half the segment, but the setting is mostly intact. Management decisions include surface restrictions along the mountain flanks where the segment runs, and a 1 mile on each side restriction is in place.

North Piney Creek to Smith's Fork Segment: This stretch of trail runs over private, BLM, and USFS lands in the western part of Wyoming. The 42-mile long segment is mostly on a county road, but the setting is almost pristine. Currently, the segment is minimally protected by BLM management decisions that restrict development within ¼ mile on each side of the trail.

Bear River Divide Segment: This 31-mile long segment is mostly BLM-administered in its northern half and is in checkerboard (alternating private and BLM) in its southern half. The northern half is in excellent condition, and the southern half is in good condition, with part of it upgraded into an oil well access road. Management decisions include surface restrictions of 1 mile on each side of the trail.

Fort Bridger to Cache Cave Segment: This section of trail is mostly on private land in a checkerboard land ownership pattern. This 44-mile long segment has been affected by a large wind-energy development, and private lands have been altered by development in some areas. The scattered BLM-administered lands have restrictions to protect the historic settings, but wind-energy development on private lands is expected to continue.

The above data indicate that segments on public land generally are better preserved than those on non-public lands; this would be expected because federal agencies have been given the responsibility to manage and protect important parts of these NHTs for several decades. Other landowning agencies, such as states or counties, might or might not have trail protection as a priority. Privately owned lands tend to be managed based on other factors, including agricultural, residential, and commercial uses, and long-protected trails can quickly become threatened if these other uses become dominant.

Analysis of Cumulative Impacts – Specific Assessment Area

As discussed above, development on or around the trails has the potential to adversely impact the physical remnants of the trails and their historical settings. The degree of impact is directly related to proximity to the trails and extent of development.

As shown on Map 140, the Specific Assessment Areas are generally held in private ownership in the portion of the trails east of the planning area. As discussed above for greater sage-grouse and the CDNST, there are few limitations on development of private lands. Accordingly, development to the east of the planning area can be anticipated to adversely impact the historical setting of the trail segments in the area. There is high wind-energy potential, and wind energy (along with uranium and oil and gas) is being developed in the Casper planning area. The trend for historical setting for the portion of the trails from Fort Laramie to Independence Rock will likely continue downward, particularly if the Pathfinder and Black Mountain Wind-Energy Development projects in the Casper planning area progress beyond their current testing activities.

As with the CDNST, the portion of the NHT Specific Assessment Areas in the Rock Springs, Kemmerer, and Pinedale planning areas have protections that are likely to beneficially impact the trails within a range of ¼ to 3 miles, but are also subject to adverse impacts associated with mineral and wind-energy development. As discussed above, increased oil or gas development is likely in all BLM planning areas reviewed here, with intense development in certain areas. While some of this development might be hidden from view, much of it will not, particularly in the areas of moderate and high potential for oil or gas to the west of the Lander planning area.

While some of the development and adverse impacts will be limited by greater sage-grouse Core Area management, segments of the trails pass through or are adjacent to non-Core Area. This development also would adversely impact trails, and has led to the Specific Assessment Areas being fragmented rather than in a continuous segment, as occurs in the South Pass segment through the planning area.

The landscape-level development identified above for greater sage-grouse will adversely impact the historical setting of the trails. When combined with the different management of NHTs under the alternatives, the following cumulative impacts would result:

Alternatives A and C: The greatest threats to the NHTs in the planning area include wind-energy development, transmission lines, and pipelines. If development along the NHTs on BLM-administered lands occurs, it will likely extend into private or state lands. Similarly, development on state or private lands will likely lead to the need for ROWs across BLM-administered lands.

Lands along portions of the South Pass High Potential Segment have high potential for wind-energy development. Wind energy companies have shown interest in lands along the NHTs in the planning area by setting up meteorological towers on private lands and by applying for meteorological-tower locations on BLM-administered lands. At present, the Lander Field Office has not approved meteorological towers close to the trails. With alternatives A and C protecting the NHTs only out to ¼ mile on each side, wind farms could be present in viable wind locations near the NHTs outside of this corridor, resulting in major impacts to their historical integrity. The cumulative adverse impacts of this kind of development on a High Potential Segment such as South Pass would be major.

Wind-energy development along the segment would necessitate power transmission line construction and expansion to service wind farms, which would further impact the integrity of the trails. Like wind farms, transmission lines are highly visible and would result in major adverse impacts to the historical settings of the NHTs. Pipeline and transmission line projects not associated with wind farms would be likely to affect the South Pass segment. Alternative A does not specify corridors where transmission lines or pipelines would be clustered, so they could be proposed on intact sections of the trail, further degrading the NHTs. Alternative C specifies preferred corridor locations; however, most of the planning area is also open to major ROWs.

Other resource uses along the NHTs in the planning area are not reasonably foreseeable as high-level threats. These other uses include oil and gas exploration, locatable minerals and phosphate mining, geophysical exploration, mineral materials disposals, and major ROW actions. However, alternatives A and C would give minimal protection from new threats, and unforeseen increases in developments could adversely impact the NHTs.

Alternatives A and C would result in cumulative adverse impacts to other trail segments in this region. Allowing development along the NHTs in the planning area would encourage developers to propose projects along other segments where NHT protection is minimal or ambiguous. These segments could include the Prospect Hill segment, portions of the South Pass segment, Big Sandy to Green River segment, the North Piney Creek to Smith's Fork segment, and portions of the Bear River Divide segment.

Alternatives B and D: Under alternatives B and D, development along the NHTs on BLM-administered lands will be restricted.

Alternatives B and D restrict wind-energy development on BLM-administered lands out to 5 miles either side of the NHTs, and require BLM-permitted wind farms past 5 miles to be hidden or to meet VRM categories. While development of wind-energy resources is always possible on private or state lands on or near the NHTs, Alternative B or D would ensure that these projects would not physically expand onto adjacent BLM-administered lands. This scenario would limit the interest in building large wind farms on BLM-administered lands in the South Pass segment, and further protect the NHTs from new disturbances and impacts. The trails in the planning area would continue to be some of the best remaining NHTs in the western United States.

Alternatives B and D limit major utility (pipeline and transmission lines) along the NHTs to designated corridors. Transmission lines or pipelines that have to cross the NHTs will be clustered, which would confine their impacts to designated areas adversely affected by earlier lines. Clustered transmission lines would mean fewer highly visible impacts on the historical settings of the NHTs.

Other resource uses along the NHTs in the planning area are expected, but are not currently seen as high-level threats. These other uses include oil and gas exploration, locatable minerals and phosphate mining, geophysical exploration, mineral materials disposals, and major ROW actions. Alternatives B and D have been designed to shield the NHTs from unforeseen threats, and the NHTs would be mostly protected from adverse impacts.

Alternative B or Alternative D could result in cumulative beneficial impacts to other trail segments in this region. Upcoming RMPs could look to this RMP for guidance and ideas about how to best manage the NHTs while still allowing development that would not adversely impact the NHTs.

4.11. Irreversible and Irretrievable Commitment of Resources

NEPA section 102(2)(C) and section 1502.16 of the CEQ NEPA implementing regulations require that the discussion of environmental consequences include a description of "…any irreversible or irretrievable commitment of resources which would be involved in the proposal should it be implemented." An irreversible commitment of a resource is one that cannot be reversed or cannot be renewed within a reasonable timeframe. Extinction of a species or disturbance to cultural resources would constitute irreversible impacts, as would extraction of sand, gravel, or oil or gas because these salable minerals cannot be renewed in the ground within a reasonable timeframe. An irretrievable commitment of a resource occurs when the resource or its use is lost for a some period. For example, a decision not to treat juniper encroachment into adjacent sagebrush habitat results in the irretrievable loss of forage production from the grassland community. This action is not irreversible because a treatment applied to the encroaching juniper could restore the forage production of the sagebrush habitat.

The decision to select one of the four alternatives described in this Draft RMP and EIS does not constitute an irreversible or irretrievable commitment of resources because the decision does not authorize implementation-level activities. Instead, decisions made under the selected alternative serve to guide future actions and subsequent site-specific decisions. Following the signing of the ROD for the RMP revision, the BLM will develop and implement implementation plans (activity- or project-specific). Implementation decisions require appropriate project-specific planning and NEPA analysis, and constitute BLM final approval authorizing on-the-ground activities to proceed.

Assuming the BLM selects one of the action alternatives, and that subsequent implementation decisions authorize activity- or project-specific plans, some irreversible and irretrievable commitment of resources would occur. However, the specific nature and extent of the impacts cannot be clearly defined because the location, scale, timing, rate of implementation, and relationship to other actions is currently unknown. Such impacts can be better assessed after site-specific implementation, including implementation of mitigation measures and assessment of the efficacy of the mitigation measures.

Even without the specifics of implementation plans, the likelihood of irreversible and irretrievable impacts to some resources can be estimated. Impacts from some actions can be both irreversible and irretrievable for some resources. Resources most likely to be affected include minerals and energy development; vegetation, including forests, forest products, and INNS; fish and wildlife and their habitats; soils; water; visual resources; wilderness; cultural resources; and paleontological resources. The management actions most likely to result in irreversible and/or irretrievable impacts include those related to development and surface disturbance such as mineral extraction, energy development, timber harvesting/silviculture treatments, livestock grazing, and trails and travel management.

In addition, the impacts of management actions are interrelated and generally affect multiple resources concurrently. For example, mineral extraction would result in an irreversible and irretrievable loss of those minerals. Impacts to vegetation, associated wildlife habitat, and livestock grazing from minerals extraction would be irretrievable and potentially irreversible if reclamation efforts prove unsuccessful. Irreversible impacts to soils and water quality could occur, depending on the implementation of mitigation measures and their efficacy. Visual resources would be irretrievably affected during extraction activities, but the effects would not necessarily be irreversible. If the extraction activities occurred near a wilderness area or lands with wilderness characteristics, those qualities could be irretrievably lost during extraction and such impacts could be irreversible. Any cultural or paleontological resources affected by extraction would be irretrievably and irreversibly lost. However, all of these impacts would be localized and could be minimized through effective mitigation.

4.12. Unavoidable Adverse Impacts

NEPA section 102(C) also mandates disclosure of “any adverse environmental effects which cannot be avoided should the proposal be implemented.” These are impacts for which there are no mitigation measures or impacts that remain even after the implementation of mitigation measures. Implementation of the RMP and subsequent activity- or project-specific plan implementation would result in unavoidable adverse impacts to some resources. Chapter 4 describes the potential impacts of implementing the RMP, summarized here. As discussed under the preceding section, *Irreversible and Irretrievable Commitment of Resources*, the specific nature and extent of implementation-level impacts cannot be clearly defined due to unknowns regarding site-specific implementation and associated mitigation measures.

In general, development and surface-disturbing activities, including those from mineral extraction, energy development, vegetative treatments or timber harvesting, OHV use, and trails and travel management would result in unavoidable adverse impacts, including soil compaction and erosion, loss of vegetative cover, spread of INNS, disturbance to and displacement of wildlife, visual intrusions on the landscape, and potential loss of cultural or paleontological resources. Conversely, proposed restrictions on some activities such as OHV use, energy development, and livestock grazing intended to protect sensitive resources and resource values would result in unavoidable adverse impacts to some users, operators, and permittees by limiting their ability to use public lands and potentially increasing their operating costs.

Chapter 5. Public Involvement, Consultation, and Coordination

5.1. Introduction

Public involvement, consultation, and coordination was initiated prior to, and occurred throughout, preparation of the Lander Resource Management Plan (RMP) revision and associated Environmental Impact Statement (EIS). The Bureau of Land Management (BLM) incorporated public involvement, consultation, and coordination through public meetings, informal meetings, individual contacts, news releases, newsletters, workshops, a planning website, and the *Federal Register*. This chapter describes the public involvement process, as well as other key consultation and coordination activities undertaken to prepare the EIS in support of the RMP revision.

The BLM decision-making process is conducted in accordance with the requirements of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA, and the United States (U.S.) Department of the Interior (DOI) and BLM policies and procedures implementing NEPA. NEPA and the associated regulatory and policy framework require that all federal agencies involve the interested public and potentially affected parties in their decision-making, consider reasonable alternatives to proposed actions, and prepare environmental documents that disclose the potential impacts of proposed actions and alternatives.

A Notice of Intent (NOI) published in the *Federal Register* on February 13, 2007, formally announced the BLM's intent to revise the existing plan and prepare the associated EIS. The NOI initiated the scoping process and invited participation of affected and interested agencies, organizations, and members of the public in determining the scope and issues to be addressed by alternatives and analyzed in the EIS. The BLM solicited additional public involvement at multiple meetings, including an open house and cooperating agency workshops, to help identify issues to be addressed in developing a full range of land management alternatives. Table 5.1, "Public Involvement, Coordination, and Consultation Events" (p. 1261) lists public involvement, coordination, and consultation events.

Table 5.1. Public Involvement, Coordination, and Consultation Events

Date	Location	Event	Type
March 19, 2007	Riverton, Wyoming	Public Scoping Meeting	Public Meeting
March 20, 2007	Shoshone, Wyoming	Public Scoping Meeting	Public Meeting
March 21, 2007	Jeffrey City, Wyoming	Public Scoping Meeting	Public Meeting
March 22, 2007	Dubois, Wyoming	Public Scoping Meeting	Public Meeting
March 23, 2007	Lander, Wyoming	Public Scoping Meeting	Public Meeting
November 5, 2007	Lander, Wyoming	Travel Management Meeting	Public Meeting
November 6, 2007	Lander, Wyoming	Travel Management Meeting	Public Meeting
November 7, 2007	Dubois, Wyoming	Travel Management Meeting	Public Meeting
November 8, 2007	Dubois, Wyoming	Travel Management Meeting	Public Meeting
January 24, 2008	Riverton, Wyoming	Travel Management Meeting	Public Meeting
March 18 – 20, 2008	Lander, Wyoming	Goals and Objectives Development Workshop	Cooperating Agency Workshop
May 21 – 23, 2008	Lander, Wyoming	Range of Alternatives Development Workshop	Cooperating Agency Workshop
June 18 – 20, 2008	Lander, Wyoming	Range of Alternatives Development Workshop	Cooperating Agency Workshop
August 20 – 21, 2008	Lander, Wyoming	Range of Alternatives Development Workshop	Cooperating Agency Workshop
September 24 – 25, 2008	Lander, Wyoming	Range of Alternatives Development Workshop	Cooperating Agency Workshop
December 3 – 5, 2008	Lander, Wyoming	Range of Alternatives Development Workshop	Cooperating Agency Workshop

Date	Location	Event	Type
January 21 – 23, 2009	Lander, Wyoming	Range of Alternatives Development Workshop	Cooperating Agency Workshop
February 18 – 20, 2009	Lander, Wyoming	Range of Alternatives Development Workshop	Cooperating Agency Workshop
December 9, 2009	Lander, Wyoming	Range of Alternatives Development Workshop	Cooperating Agency Workshop
March 31, 2010	Lander, Wyoming	Open House	Public Meeting
May 12 – 14, 2010	Lander, Wyoming	Preferred Alternative Development Workshop	Cooperating Agency Workshop

5.2. Public Involvement

In accordance with CEQ scoping guidance, the BLM provided opportunities for public involvement as an integral part of revising the RMP and preparing the EIS. CEQ scoping guidance defines scoping as the "process by which lead agencies solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed and the methods by which they will be evaluated" (CEQ 1981). The scoping comment summary report, which summarizes comments received during the scoping process, is available on the Lander RMP website at http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander/docs.html.

The intent of the scoping process is to provide an opportunity for the public, tribes, other government agencies, and interest groups to learn about the project and provide input on the planning issues, impacts, and potential alternatives that will be addressed in the EIS, and the extent to which those issues will be analyzed. In general, public involvement during scoping assists the agency through the following:

- Broadening the information base for decision-making
- Informing the public about the EIS and proposed RMP and the potential impacts associated with various management decisions
- Ensuring public needs and viewpoints are brought to the attention of the agency
- Determining the scope and the significant issues to be analyzed in depth in the EIS

5.2.1. Scoping Period

The scoping period for the Lander RMP revision began with the publication of the NOI in the *Federal Register* on February 13, 2007 and ended on April 13, 2007. The scoping period provides an opportunity for the public to identify potential planning issues and concerns associated with the RMP and EIS. Information obtained by the BLM during scoping is combined with issues identified by the agencies to form the scope of the EIS.

5.2.2. Public Notification of Scoping

News Release

The BLM issued a news release to local media on February 13, 2007, describing the Lander RMP revision, and issued a subsequent news release on March 2, 2007, listing the time, date, and location of the public scoping meetings. Copies of the news releases went out to numerous media outlets within and outside the planning area. The news releases were also posted on the Lander RMP website.

Additional Sources of Public Information about the Scoping Process

In addition to news releases and other notifications from the BLM regarding the scoping process, some members of the public received notification from other sources. Several articles and news bulletins regarding some aspect of the RMP process were published in local newspapers. Many of the articles listed the dates for the scoping period and the dates, times, and locations of public scoping meetings.

Website

The Lander RMP website provides background information on the project, a description of the scoping process and meeting locations, instructions on how to submit comments, and copies of public information documents such as the NOI and the 1987 Lander RMP. The website is one of the methods used to communicate project news and updates to the public. The website can be accessed at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander.html.

5.2.3. Scoping Meetings

During the week of March 19, 2007, the BLM hosted scoping meetings in five locations across the planning area. Table 5.1, "Public Involvement, Coordination, and Consultation Events" (p. 1261) lists the scoping meeting locations and dates. The five public scoping meetings provided the public with an opportunity to learn and ask questions about the project, the planning process, and to submit their issues and concerns to the BLM. The BLM chose an open house format to encourage broader participation, to allow attendees to learn about the project at their own pace, and to enable attendees to ask questions of BLM representatives in an informal one-on-one setting. The BLM also provided handouts and presented displays at each scoping meeting.

The BLM encouraged meeting attendees to comment by submitting written comment forms (either at the meetings or via U.S. Postal Service) or by sending an e-mail. Comment sheets were available to attendees at all meetings.

5.2.4. Open Houses/Public Meetings

The BLM held one open house meeting in Lander, Wyoming, on March 31, 2010. Similar to the public scoping meetings, resource specialists and other representatives of the BLM were on hand to personally address questions and provide information to meeting participants. The BLM also hosted five public workshops to obtain information and input on travel management and recreational activities at locations throughout the planning area. Refer to Table 5.1, "Public Involvement, Coordination, and Consultation Events" (p. 1261) for meeting times and locations.

Mailing List

The BLM compiled a project mailing list of individuals, agencies, and organizations that participated in past BLM projects or requested to be on the general mailing list. Visitors to the scoping meetings were asked to sign in and provide their mailing address so that they could also be added to the mailing list. Other additions to the mailing list include those individuals who have submitted requests to be added to the list. Duplicate entries, changes of address, and return-to-sender mailings were deleted from the official project mailing list as identified. Through this process, the general mailing list was revised to approximately 975 entries. Requests to be added to or to remain on the official mailing list will continue to be accepted throughout the planning process.

Newsletters

Periodic newsletters have been developed and distributed to keep the public informed of the Lander RMP revision. Six newsletters have been e-mailed and mailed to individuals on the Lander RMP mailing list prior to the issuance of the Lander Draft RMP and EIS. The newsletters have also been made available for download on the Lander RMP website.

Website

The Lander RMP website can be found at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/lander.html. The website serves as a virtual repository for documents related to the development of the RMP, including announcements, newsletters, and documents. The documents are available in PDF format to ensure they are accessible to the widest range of interested parties. The website provides the public an opportunity to submit their comments for consideration as part of the planning process and to be added to the project mailing list.

Field Trips

On June 18, 2008, the BLM held a field trip to tour portions of the planning area with cooperating agencies. The group visited Red Canyon overlook, Crow's Nest/South Pass, Gilespie/Sweetwater Canyon, and Beaver Rim. At each area, the BLM and cooperating agencies discussed the values as well as the issues of each site in order to better understand and address the management needs of these sites.

The BLM organized field trips from September 8, 2009 to September 11, 2009, that were attended by the BLM and representatives from six Native American tribes. The field trips provided an opportunity for the BLM and the tribal representatives to discuss issues and concerns related to the RMP revision, as well as two other energy related projects proposed in the planning area. The BLM also sought input from tribal representatives about areas of cultural importance to their tribes that might be impacted by these projects. Native American consultation is discussed in Section 5.3.3, "Native American Interests" (p. 1267).

5.2.5. Future Public Involvement

Public participation efforts will be ongoing throughout the remainder of the process of revising the RMP and developing the EIS. During the 90-day public comment period for the Draft RMP and EIS, the BLM will hold public meetings. The dates and locations for each meeting will be advertised at least 15 days in advance of the meetings through e-mail, the Lander RMP website, and other public announcements. The Proposed RMP and Final EIS will consider all substantive oral and written comments on the Draft RMP and EIS. Members of the public with standing will have the opportunity to protest the content of the Proposed RMP and Final EIS during the specified 30-day protest period. The Record of Decision will be issued by the BLM after the release of the Final EIS, the Governor's Consistency Review, and protest resolution.

5.3. Consultation and Coordination

This section documents the consultation and coordination efforts undertaken by the BLM throughout the RMP revision process. Title II, Section 202 of the Federal Land Policy and Management Act (FLPMA) directs the BLM to coordinate planning efforts with Native American tribes, other federal departments, and agencies of the state and local governments as part of its land use planning process. The BLM is directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 Code of Federal Regulations 1500.4-5). The BLM accomplished coordination with other agencies and consistency with other plans through ongoing communications, meetings, and collaborative efforts with the BLM Interdisciplinary Team, which includes BLM specialists, and federal, state, and local agencies.

5.3.1. Cooperating Agencies

The BLM invited local, state, federal, and tribal representatives to participate as cooperating agencies on the Lander RMP revision and EIS. The BLM invited the entities listed below to participate in the process because they have jurisdiction by law or because they could offer special expertise. Those who responded and requested cooperating agency status, are noted with an asterisk (*).

Counties

- Carbon County Commission*
- Fremont County Commission*
- Hot Springs County Commission*
- Natrona County Commission
- Sweetwater County Commission*

Conservation Districts

- Dubois-Crowheart Conservation District*
- Popo Agie Conservation District*
- Lower Wind River Conservation District*
- Sweetwater County Conservation District*
- Natrona County Conservation District*
- Saratoga-Encampment-Rawlins Conservation District
- Hot Springs Conservation District

Wyoming State Agencies

- Office of the Governor*
- Office of State Lands and Investments*
- Wyoming Department of Agriculture*
- Wyoming Department of Environmental Quality*
- Wyoming Department of Revenue
- Wyoming Department of State Parks and Cultural Resources*
- Wyoming Game and Fish Department*
- Wyoming Oil and Gas Conservation Commission*
- Wyoming State Engineer’s Office*
- Wyoming State Forestry Division
- Wyoming State Geological Survey*

- Wyoming State Historic Preservation Office*
- Wyoming State Planning Office*
- Wyoming Trails*
- Wyoming Water Development Commission

Federal Agencies

- Bureau of Indian Affairs – Wind River Agency
- National Park Service – National Trails System, Intermountain Region*
- U.S. Environmental Protection Agency (EPA), Region 8
- U.S. Forest Service – Shoshone National Forest
- U.S. Fish and Wildlife Service*

Tribes

- Eastern Shoshone
- Northern Arapaho
- Crow Tribe
- Oglala Sioux
- Rosebud Sioux
- Northern Cheyenne
- Cheyenne River Sioux
- Northern Ute
- Shoshone Bannock

The BLM formally invited the cooperating agencies to participate in developing the alternatives, RMP and EIS, and to provide data and other information relative to their agency responsibilities, goals, mandates, and expertise. Cooperating agencies provided input during the initial scoping process, and throughout the revision process the BLM held general meetings with cooperating agencies to discuss procedures and processes. The BLM and cooperating agencies held several workshops to develop goals and objectives, a range of alternatives, and the Preferred Alternative between March 2008 and May 2010. Cooperating agencies have also provided comments on draft RMP related documents throughout the revision process. Refer to Table 5.1, "Public Involvement, Coordination, and Consultation Events" (p. 1261) for a list of meeting dates.

5.3.2. Section 7 Consultation

The Lander Field Office contacted the U.S. Fish and Wildlife Service (USFWS) regarding Section 7 of the Endangered Species Act and the Lander RMP revision. On September 6, 2007, the USFWS provided a list of threatened and endangered species likely to occur on BLM-administered land in the Lander Field Office, for evaluating BLM Section 7 responsibilities. The USFWS was also provided opportunities to comment on draft RMP related documents during the revision process. A copy of the September 2007 consultation letter is located in Section 5.5, "Consultation Letters" (p. 1272). The USFWS provided comments on the preliminary draft Biological Assessment. The Lander Field Office will continue consultation with the USFWS regarding the RMP revision through completion of the final biological assessment and Final EIS and Proposed RMP.

5.3.3. Native American Interests

Consultation with Native American tribes is a requirement of FLPMA and BLM guidance. On February 2, 2005, the BLM sent letters inviting Native American tribes to be cooperating agencies as part of the RMP revision. The BLM sent additional letters on August 10, 2009 to the 16 tribes listed below requesting further input on issues of religious and cultural importance. Consultation letters are located in Section 5.5, "Consultation Letters" (p. 1272).

- Cheyenne River Sioux
- Crow Nation
- Eastern Shoshone
- Northern Arapaho
- Northern Cheyenne
- Ute Indian
- Oglala Sioux
- Rosebud Sioux
- Shoshone Bannock
- Southern Cheyenne and Arapaho
- Three Affiliated Tribes of Mandan, Hidatsa, and Arikira Nation
- Lower Brule Sioux
- Yankton Sioux
- Fort Peck Assiniboine Sioux
- Standing Rock Sioux
- Crow Creek Sioux

The BLM requested specific information from the tribes to help identify areas of special concern and to gather input on appropriate protection measures for sensitive cultural sites. The letters also invited tribal representatives to participate in field trips within the planning area in September 2009. BLM representatives followed these letters with telephone calls to each tribe. In letters and during the follow-up calls, the BLM stressed its desire for tribal input on this Draft RMP and EIS. Representatives from six tribes attended the field trips which were held from September 8, 2009 to September 11, 2009. Government-to-government consultation with the tribes will continue throughout the RMP revision process.

5.4. Distribution List

The BLM distributed the Draft RMP and EIS to the following entities for their review and comment

TRIBAL GOVERNMENTS

- Eastern Shoshone
- Northern Arapaho
- Crow Tribe
- Oglala Sioux
- Rosebud Sioux
- Northern Cheyenne
- Cheyenne River Sioux
- Northern Ute
- Shoshone Bannock

LOCAL GOVERNMENTS (COUNTIES, CITIES, TOWNS)

Carbon County, Wyoming

- Carbon County Commission
- Saratoga-Encampment-Rawlins Conservation District
- City of Rawlins
- Town of Saratoga

Fremont County, Wyoming

- Fremont County Commission
- Dubois-Crowheart Conservation District
- Lower Wind River Conservation District
- Popo Agie Conservation District
- City of Lander
- City of Riverton
- Town of Dubois

Hot Springs County, Wyoming

- Hot Springs County Commission
- Hot Springs Conservation District
- Town of Thermopolis

Natrona County, Wyoming

- Natrona County Commission
- Natrona County Conservation District
- City of Casper

Sweetwater County, Wyoming

- Sweetwater County Commission
- Sweetwater County Conservation District
- City of Rock Springs
- City of Green River

Teton County, Wyoming

- Teton County Commission
- Teton Conservation District

STATE OF WYOMING

- Senator Leland Christensen
- Senator Eli Bebout
- Senator Cale Case
- Senator Marty Martin
- Senator Larry Hicks
- Senator Gerald Geis
- Senator Kit Jennings
- Senator Bill Landen
- Senator Drew Perkins
- Senator Charles Scott
- Senator John Hastert
- Senator Stan Cooper
- Senator Don Dockstader
- Representative Donald Burkhart, Jr.
- Representative William “Jeb” Steward
- Representative W. Patrick Goggles
- Representative Del McOmie
- Representative David Miller
- Representative Rita Campbell
- Representative Keith Gingery

- Representative Joseph Barbuto
- Representative Lorraine Quarberg
- Representative Bob Brechtel
- Representative John Freeman
- Representative Gerald Gay
- Representative Kendell Kroeker
- Representative Bunky Loucks
- Representative Steve Harshman
- Representative Thomas Lockhart
- Representative Lisa Shepperson
- Representative Tim Stubson
- Representative Stan Blake
- Representative Bernadine Craft
- Representative Kathy Davison
- Representative Allen Jaggi
- Representative Ruth Petroff
- Representative Jim Roscoe

WYOMING STATE AGENCIES

- Office of the Governor, Environmental Policy Division
- Office of State Lands and Investments
- Wyoming Business Council
- Wyoming Department of Administration and Information
- Wyoming Department of Agriculture
- Wyoming Department of Employment, Research, and Planning Division
- Wyoming Department of Environmental Quality
    - Air Quality Division
    - Land Quality Division
    - Water Quality Division
- Wyoming Department of Revenue
- Wyoming Department of State Parks and Cultural Resources
- Wyoming Department of Transportation
- Wyoming Game and Fish Department
- Wyoming State Engineer's Office
- Wyoming State Forestry Division
- Wyoming State Geological Survey
- Wyoming State Historic Preservation Office
- Wyoming State Planning Office
- Wyoming Trails

WYOMING STATE BOARDS/COMMISSIONS

- Air Quality Advisory Board
- Board of Wildlife Commissioners
- Natural Gas Pipeline Authority
- Agriculture Board
- Environmental Quality Council
- Farm Bureau Federation
- Land Quality Advisory Board
- Livestock Board

- Mining Council
- Wyoming Oil and Gas Conservation Commission
- Recreation Commission
- State Board of Outfitters and Professional Guides
- State Grazing Board
- Wyoming Trails Advisory Council
- Wyoming Water Development Commission

WEED AND PEST CONTROL DISTRICTS

- Carbon County Weed and Pest Control District
- Fremont County Weed and Pest Control District
- Hot Springs County Weed and Pest Control District
- Natrona County Weed and Pest Control District
- Sweetwater County Weed and Pest Control District

ASSOCIATIONS/COUNCILS

- Coalbed Methane Coordination Coalition
- Mormon Trails Association
- Oregon-California Trails Association
- Petroleum Association of Wyoming
- Wildlife Habitat Council
- Wyoming Association of Municipalities
- Wyoming Association of Conservation Districts
- Wyoming County Commissioners Association
- Wyoming Mining Association
- Wyoming Natural Diversity Database
- Wyoming Outdoor Council
- Wyoming Stockgrowers Association
- Wyoming Wilderness Association
- Wyoming Woolgrowers Association
- Independent Petroleum Association of Mountain States

CLUBS/ALLIANCES/SOCIETIES/GROUPS

- Alliance for Historic Wyoming
- Audubon Society
- Audubon Wyoming
- Back Country Horsemen of America
- Biodiversity Conservation Alliance
- Foundation for North American Wild Sheep
- Greater Yellowstone Coalition
- Guardians of the Range
- Izaak Walton League
- Land and Water Fund of the Rockies
- Murie Audubon Society
- National Wildlife Federation
- North American Pronghorn Foundation
- Public Lands Advocacy Rocky Mountain Elk Foundation
- Sierra Club
- The Conservation Fund

- The Land Trust Alliance
- The Nature Conservancy
- The Wilderness Society
- The Wildlife Society
- Trout Unlimited
- Western Lands Project
- Western Watersheds Project
- Wyoming Wildlife Federation
- Wyoming Wildlife and Natural Resource Trust

CONGRESSIONAL DELEGATION

- U.S. Senator Michael Enzi
- U.S. Senator John Barrasso
- U.S. Representative Cynthia Lummis

U.S. DEPARTMENT OF THE INTERIOR

- Bureau of Indian Affairs
- Bureau of Reclamation
- National Park Service
- Office of Environmental Policy and Compliance
- Natural Resources Library
- Office of Surface Mining
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
  - Washington, D.C.
  - Cheyenne, Wyoming
- Bureau of Land Management
  - Washington, D.C.
  - Wyoming State Office, Cheyenne
  - Wyoming Field Offices: Buffalo, Casper, Cody, Kemmerer, Newcastle, Pinedale, Rawlins, Rock Springs, and Worland

OTHER FEDERAL AGENCIES

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture Forest Service
  - Shoshone National Forest
- U.S. Department of Agriculture Natural Resources Conservation Service
- U.S. Army Corps of Engineers
- Department of Energy Western Area Power Administration
- Federal Highway Administration
- Federal Energy Regulatory Commission
- U.S. Government Printing Office
- Oceanic and Atmospheric Administration's National Weather Service

LIBRARIES

- Library of Congress
- University of Wyoming Library
- Carbon County Library
- Fremont County Public Library

- Hot Springs County Library
- Natrona County Library
- Sweetwater County Library

EDUCATIONAL INSTITUTIONS

- Central Wyoming College
- University of Wyoming
- Western Wyoming Community College
- Wyoming Community College Commission

MEDIA

Newspapers

- Casper Journal, Casper, Wyoming
- Casper Star Tribune, Casper, Wyoming
- Dubois Frontier, Dubois, Wyoming
- Rawlins Daily Times, Rawlins, Wyoming
- Lander Journal, Lander, Wyoming
- Riverton Ranger, Riverton, Wyoming
- Rock Springs Rocket-Miner, Rock Springs, Wyoming
- The Independent Record, Thermopolis, Wyoming
- Wyoming Livestock Roundup, Casper, Wyoming

Radio

- KTHE - AM, Thermopolis
- KVOW - AM/KTAK - FM, Riverton
- KOVE - AM/KDLY - FM, Lander
- KTWO - AM/KMGW - FM/KUWC - FM, Casper
- KUGR - AM, Green River (Sweetwater County)
- KRKK - AM/KUWZ - FM, Rock Springs
- KIQZ - FM/KRAL - AM, Rawlins
- K217BP - FM, Dubois
- Wyoming Public Radio, Laramie

5.5. Consultation Letters

Section 7 Consultation Letter

BLM-0036

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

In Reply Refer To:

SEP - 6 2007

ES-61411/W.02/WY07SL0470

Memorandum

To: Robert Ross, Field Manager, Bureau of Land Management, Lander Field Office, Lander, Wyoming
From: Brian T. Kelly, Field Supervisor,U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Species List for Lander Field Office

Please find attached the U.S. Fish and Wildlife Service's (Service) current list of endangered, threatened, non-essential/experimental and candidate species which may occur within the Bureau of Land Management, Lander Field Office's (Bureau) area of management. This memorandum supersedes our August 8, 2007, based on (1) reviewing of species potential range and (2) changes in species status. The list is provided as a general reference for the Bureau to use when evaluating actions under the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.)*. We have included information that may be useful in the development of a project assessment for listed species, as well as other areas of Service trust authorities such as the Migratory Bird Treaty Act (16 U.S.C. 703), the Bald and Golden Eagle Protection Act (16 U.S.C. 668), and wetlands protection.

Although we intend to update this list annually or when additions or changes in species' status occur, the Bureau should contact this office to verify the list before analyzing any federal action. If you have any questions regarding this letter or your responsibilities under the Act, please contact Alex Schubert of my staff at (307) 772-2374, extension 238.

Attachments (3)

cc: BLM, T&E Coordinator, Cheyenne (J. Carroll)
BLM, Wildlife Biologist, Lander (S. Oberlie)
BLM, Wildlife Biologist, Lander (G. Morgan)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne (V. Stelter)
WGFD, Non-Game Coordinator, Lander (B. Oakleaf)

BLM-0036

Attachment 1

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

Threatened and Endangered Species and Candidate Species
Bureau of Land Management, Lander Field Office
Updated September 4, 2007

Species	**Status**	**Expected Occurrence**
Black-footed ferret *(Mustela nigripes)*	Endangered	Prairie dog towns
Blowout penstemon *(Penstemon haydenii)*	Endangered	Sand dunes
Gray wolf *(Canis lupus)*	Experimental	Greater Yellowstone ecosystem
Canada lynx *(Lynx canadensis)*	Threatened	Montane forests
Desert yellowhead *(Yermo xanthocephalus)*	Threatened	Beaver Rim, Fremont County
Critical Habitat for Desert Yellowhead	Designated	Beaver Rim, Fremont County
Ute ladies'-tresses *(Spiranthes diluvialis)*	Threatened	Seasonally moist soils and wet meadows of drainages below 7000 feet elevation.

If the proposed action will lead to water depletion (consumption) in the Platte river systems, impacts to the following species and critical habitat should be included in the evaluation:

Whooping crane *(Grus americana)*	Endangered	Downstream riparian and riverine habitat of the Platte River system
Interior least tern *(Sterna antillarum)*	Endangered	see above

Attachment 1

Piping plover *(Charadrius melodus)*	Threatened	see above
Pallid sturgeon *(Scaphirhynchus albus)*	Endangered	see above
Western prairie fringed orchid *(Platanthera praeclara)*	Threatened	see above
Critical habitat for Whooping crane Piping plover	Designated	

Federal Agency Responsibilities
The Service has responsibility, under a number of federal laws, treaties, executive orders, and memoranda of agreement, for the conservation and management of fish and wildlife resources. Some of these same authorities also require other federal agencies to consider, avoid, or prevent adverse impacts to fish, wildlife, and wetland resources. To ensure resources are afforded adequate consideration and protection, federal agencies are often required to consult with the Service regarding potential impacts their actions may have on fish and wildlife resources.

When reviewing proposed actions of other agencies, this office normally focuses on three broad categories of trust resources: (1) threatened, endangered, and candidate species, (2) migratory birds, and (3) wetlands and riparian areas. The Service provides recommendations for protective measures for threatened and endangered species in accordance with the Act. Protective measures for migratory birds are provided pursuant to the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703 and Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668. Wetlands are protected pursuant to Section 404 of the Clean Water Act, Executive Order 11990 (wetland protection) and Executive Order 11988 (floodplain management) with the goal of "no net loss of wetlands." Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661 *et seq.),* and the Fish and Wildlife Act of 1956, as amended (16 U.S.C. 742a-742j).

Federal agency actions may range from small, site specific, short duration projects to expansive, long-term programs. Because of the wide range of possible actions, the Service provides the following comments with the understanding that this list of comments may not be all inclusive or may not be applicable for each federal project.

Regulations implementing the Act at 50 CFR §402.12 require the preparation of a biological assessment for any federal action that is a major construction activity to determine the effects of the proposed action on listed and proposed species. If a biological assessment is not required (i.e., all other actions), the lead federal agency is responsible for review of proposed activities to determine whether listed species will be affected. If it is determined that the proposed activities may affect a listed species, you should contact the Service to discuss consultation requirements. If it is determined that any federal agency program or project "is likely to adversely affect" any listed species, formal consultation should be initiated with this office. Alternatively, informal consultation can be continued so the Service can assist you in determining how the project could be modified to reduce impacts to listed species to the "not likely to adversely affect" threshold.

Attachment 1

If it is concluded that the project "is not likely to adversely affect" listed species, you should request that the Service review the assessment and concur with the determination.

For those actions where a biological assessment is necessary, it should be completed within **180 days** of receipt of a species list. This deadline can be extended by mutual agreement between the lead agency and the Service. If the assessment is not initiated within 90 days of receipt of a species list, the list of threatened and endangered species should be verified with the Service prior to initiation of the assessment. The biological assessment may be undertaken as part of the agency's compliance with section 102 of the National Environmental Policy Act (NEPA), and incorporated into the NEPA documents. The Service recommends that biological assessments include:

1. A description of the project.
2. A description of the specific area potentially affected by the action.
3. The current status and habitat use of threatened and endangered species in the project area.
4. A discussion of the methods used to determine the information in item 3.
5. The direct and indirect impacts of the project to threatened and endangered species.
6. An analysis of the effects of the action on listed and proposed species and their habitats including cumulative impacts (pursuant to the Act) from State, or private projects in the area.
7. Measures that can potentially reduce or eliminate adverse impacts to threatened and endangered species.
8. The expected status of threatened and endangered species in the future (short and long term) during and after project completion.
9. A determination of "is likely to adversely affect" or "is not likely to adversely affect" for listed species.
10. A determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species.
11. Alternatives to the proposed action considered, a summary of how impacts of those alternatives on listed and proposed species would differ from the proposed actions, and the reasons for not selecting those alternatives.
12. Citations of literature and personal contacts used in the assessment.

Migratory Birds
Under the MBTA and BGEPA, the federal agency has a mandatory obligation to protect the many species of migratory birds, including eagles and other raptors which may occur on lands under its jurisdiction. In order to promote the conservation of migratory bird populations and their habitats, the Service recommends that the federal agency implement those strategies outlined within the Memorandum of Understanding directed by the President of the U.S. under Executive Order 13186, where possible.

During project planning analysis of the following information is recommended to determine project effects to migratory birds:

1. The current status and habitat use of migratory birds in the project area. This may include number of individuals, breeding pairs, population trends, and active nests within and adjacent to the project area.

Attachment 1

2. An analysis of the effects of the proposed action on migratory birds and their habitats. Measures that will reduce or eliminate adverse impacts to migratory birds, including protective buffers, seasonal restrictions, maintenance of habitat within the project area, raptor-proofing power lines, and netting of waste pits.
3. The projected short and long term impacts to migratory birds and their trends during and after project completion using monitoring, modeling and current literature.

Potential adverse effects to migratory birds from power lines should be identified and every attempt to mitigate such effects should be implemented. Structures that are identified as affecting birds should be made safe to prevent subsequent mortalities. If you determine that power poles and/or stretches of power line are resulting in electrocution of migratory birds, especially raptors, the Service requests that specific information be documented regarding these mortalities. Based on regulations pursuant to the MBTA and BGEPA, migratory bird carcasses may only be collected, possessed or moved by state game wardens, Service refuge officers, Service special agents, or persons holding a valid salvage permit issued by the Service and the applicable state. When a migratory bird mortality is observed the Service recommends that as much of the following information as possible be documented: legal location, GPS location, all identifying numbers from the nearest power pole, date of observation, species, photographs of pole (top section), and the dead bird, and directions to the scene. Please contact our office with the information and call or email Dominic Domenici of the Service's Law Enforcement Office at 307-261-6365 /dominic_domenici@fws.gov to report your observation and obtain further guidance. The Service appreciates your efforts to protect migratory birds.

Wetlands

The functions and values of wetlands are well documented and are especially important in the arid west. Substantial degradation diminishes the effectiveness of wetlands to function as food, cover, and breeding sites for wetland dependent species; sediment transport systems; water retention/storage sites; contaminant sinks; and chemical exchange sites. To ensure the Service has sufficient information to assess project impacts on wetlands, assessments should include:

1. An enumeration of the acreage of wetlands, by type, impacted by the proposed action.
2. A discussion of why wetlands cannot be avoided.
3. A description of the functions and values of the wetlands, including sediment transport, water storage, habitat for aquatic and terrestrial organisms, and contaminant sinks, as well as the potential risks of water removal for these functions and values.
4. Measures that will reduce or eliminate adverse impacts to wetlands such as a mitigation plan to offset unavoidable impacts, protective buffers, seasonal and physical restrictions, maintenance of the natural hydrograph, and development and implementation of a monitoring program to track the effectiveness of mitigation measures.
5. Results of wetland monitoring or management activities in, or adjacent to, the proposed project site.
6. The anticipated short and long term effects to wetland and riparian areas during and after project completion.

We recommend the federal agency address each of the above concerns where applicable to the project. Without this information it may be difficult for the Service to effectively review assessments.

Attachment 2

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

In Reply Refer To:
ES-61411/BFF/WY7746

February 2, 2004

Dear Interested Party:

This letter is to inform you that black-footed ferret *(Mustela nigripes)* surveys are no longer necessary in black-tailed prairie dog colonies statewide or in white-tailed prairie dog towns except those noted in the attachment. In response to requests from numerous entities and our own review of the situation regarding ferret surveys, the U.S. Fish and Wildlife Service (Service) and others have been evaluating the potential for a previously unidentified black-footed ferret population to occur in Wyoming and the need for conducting black-footed ferret surveys across the entire state. This issue has been especially pertinent when evaluating various activities for compliance with the Endangered Species Act of 1973 (Act), as amended (16 USC 1531 *etseq).*

The black-footed ferret was listed as an endangered species in 1967, prior to the Act (under the Endangered Species Preservation Act of 1966). The Act prohibits the take of listed species without proper permits and places an additional requirement on activities funded, authorized or carried out by Federal agencies to ensure that such actions will not jeopardize the continued existence of any listed species. The latter process is known as interagency consultation and is outlined in section 7(a)(2) of the Act (50 C.F.R. ' 402.13).

The Service developed the 1989 *Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act* (Survey Guidelines) to assist with section 7 consultations for ferrets. The Survey Guidelines provide a mechanism to evaluate the possibility of locating existing ferrets in prairie dog colonies by examination of the size, density, and juxtaposition of existing prairie dog colonies. The key points of the strategy are to determine the existence of ferrets or an area=s potential for ferret recovery and either may be used in section 7 consultations when determining whether an action may affect the black-footed ferret. The Survey Guidelines can be followed by interested parties (federal agencies and their partners) during the section 7 consultation process to make determinations on whether an activity may adversely affect ferrets. However, an unintended drawback to the Survey Guidelines is that repetitive surveys may be undertaken to evaluate possible impacts to ferrets on prairie dog colonies that have already been searched or that didn=t present any realistic opportunities for ferret reintroduction.

Attachment 2

The Service has been coordinating with the Wyoming Game and Fish Department in reviewing information about the current and historic status of prairie dog towns throughout Wyoming. In addition to the status review, we have also been reviewing the history of black-footed ferret surveys to determine whether the survey guidelines should continue to be applied across the entire state. Through this process, the Service has developed an initial list of blocks of habitat that are not likely to be inhabited by black-footed ferrets. In these areas, take of individual ferrets and effects to a wild population are not an issue and surveys for ferrets are no longer recommended. The term Ablock clearance® has often been used to describe this type of approach. This initial list is based largely on the quality of the habitat today, as well as information regarding past population bottlenecks that may have resulted from plague and poisoning events in particular areas and may have led to the loss of ferrets in the area.

Additional information regarding the survey effort on the specific areas not yet block-cleared is currently being reviewed by the Service. Based on this review, the Service will likely add several blocks of habitat to the list in the future. The Service will continue to collect and review information on any remaining areas to determine if they should be added to the list of areas cleared from the survey recommendation. Therefore, prior to conducting surveys, you should coordinate with the Service to determine which specific areas are recommended for surveys. We have attached our initial list of areas cleared from the ferret survey recommendation. We believe this approach is not only biologically defensible, but also allows all parties involved to focus survey effort and resources on those areas where the likelihood of discovering wild ferrets is greatest.

Please note that Ablock clearance® must not be interpreted to mean that the area is free of all value to black-footed ferrets. These areas, or blocks, are merely being cleared from the need for ferret surveys. Therefore, this clearance from the survey recommendations reflects only the negligible likelihood of a wild population of ferrets occurring in an area. It does not provide insight into an area=s value for survival and recovery of the species through future reintroduction efforts. Nor does this clearance relieve a Federal agency of its responsibility to evaluate the effects of its actions on the survival and recovery of the species. For example, while an action proposed in a cleared area needs no survey and is not likely to result in take of individuals, the action could have an adverse effect upon the value of a prairie dog town as a future reintroduction site and should be evaluated to determine the significance of that effect. Consultation with the Service is appropriate for any agency action resulting in an effect significant enough to diminish a site=s value as a future reintroduction site. Additionally, block clearance of an area does not imply that other values of maintaining the integrity of the prairie dog ecosystem are unimportant.

Attachment 2

We appreciate your efforts to conserve listed species. Without the valuable information collected to date in association with black-footed ferret surveys, we would not be able to undertake this effort to focus ferret surveys on the most promising habitat. If you have any questions regarding this letter or your responsibilities under the Act, please contact Mary Jennings of my staff at the letterhead address or phone (307) 772-2374, extension 32.

Sincerely,

/s/Brian T. Kelly

Brian T. Kelly
Field Supervisor
Wyoming Field Office

Enclosure (1)

cc: WGFD, Non-Game Coordinator, Lander, WY (B. Oakleaf)
FWS, BFF Recovery Coordinator, Laramie, WY (M. Lockhart)

BLM-0036

Attachment 3

Black-footed Ferret Survey Block Clearance List **February 1,2004**

The following blocks of black-footed ferret habitat are cleared from the recommendation for ferret surveys:

1. All black-tailed prairie dog towns in Wyoming
2. All white-tailed prairie dog towns in Wyoming EXCEPT those identified in the following table.

Complex Name	**Townships**	**Ranges**	**Complex Name**	**Townships**	**Ranges**
Baxter Basin	T18,T19,T20	R103, R104	Fifteen Mile	T47-T49 T48	R97, R98 R96 (west half)
Big Piney	T28 T29,T30,T31	R111.R112 R109-R111	Flaming Gorge	T12,T13 T12-T14 T13	R109 R108 R107
Bolton Ranch	T17 T18,T19	R86, R88 R86-R88	Manderson	T47, T48 T49	R90, R91 R91
Carter	T16.T17 T18	R114-R116 R115	Moxa	T15,T16 T17,T18 T19,T20 T21 T22,T23 T24	R112, R113 R111-R113 R111-R114 R110-R113 R111-R113 R112
Continental Divide	T16 T17 T18 T19 T20	R93-95 R92-95, 98-100, 97-98 R92-96, 98-99 R92-96 R92-95	Pathfinder	T27 T28 T29	R85, R86 R85-R89 R85, R89
Cumberland	T16 T17-T19 T19, T20	Rl 18 R117 RI16	Saratoga	T14 T15 T16	R82, R83 R82-R84 R83-R85
Dad	T15,T16 T17	R90-R93 R92, R93	Seminoe	T23,T24	R84, R85
Desolation Flats	T13 T14 T15 T16	R93-95 R93-94 R93-94, 96 R93-96	Shamrock Hills	T22, T23 T24.T25 T26	R89, R90 R89 R89, R90

Native American Consultation Letters

1610/Lander RMP

February 2, 2005

CERTIFIED MAIL NO. 7003 1680 0007 2163 7250
RETURN RECEIPT REQUESTED

Ivan Posey
Chairman
Eastern Shoshone Tribe
P.O. Box 217

Ft. Washakie, Wyoming 82514

Dear Chairman Posey:

The Bureau of Land Management (BLM) Lander Field Office (LFO) will be revising the Lander Resource Management Plan (RMP). As part of this project, a supporting environmental impact statement will be prepared. As yet, we have not begun our revision effort, but would like to initiate the collaboration process early to establish effective professional and personal relationships.

The revised Lander RMP is being developed to provide future direction for managing approximately 2.5 million acres of public land and 2.7 million acres of Federal mineral estate in Fremont, Natrona, Sweetwater, Carbon, and Hot Springs counties. Attached is a map of the planning area for easy reference.

We would like to provide an opportunity for you to be a cooperator as we begin the process of revising our RMP.

The Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508) emphasize the use of such cooperation as a means of assuring timely coordination with Tribal, State, Federal, and local agencies in preparation of NEPA analyses and documentation.

We wish to seize every opportunity to work together in a cooperating agency relationship where a Tribal, State or local agency has decision making authority or special expertise that can enhance and enrich BLM's planning efforts. Not only can BLM's decisions for the public lands have an effect on neighboring communities, but Tribal, State and local participation with BLM, in the spirit of NEPA, can help assure that we make the best possible decisions.

Developing partnerships between cooperators and BLM will create a stronger, more efficient NEPA process. This will help lead to sustainable decision making for the lands and resources under our respective jurisdictions, and a healthy economy and environment that will serve all citizens well.

An attached return form is provided for your convenience in responding to this invitation. If you would like further information or want to request a meeting, please contact Carol-Anne Murray, Lander RMP Project Manager at (307) 332-8448. We look forward to working with you on this as well as future cooperative efforts.

Sincerely,

/ s / JACK C. KELLY

Field Manager

2 Attachments:
    1 - Map of the planning area
    2 - Return form

CMURRAY:pdr:02/01/05 E Shojtr

CORRESPONDENCE STAMP

{ } READING FILE
{X} CASE FILE

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Lander Field Office
P.O. Box 589
Lander, Wyoming 82520

1610 (050)
Lander RMP Revision
Beaver Creek EIS
GMI EIS

August 10, 2009

CERTIFIED MAIL NO.: 7007 1490 0002 1545 0841
RETURN RECEIPT REQUESTED

Ute Indian Tribe
Mr. Curtis Cesspooch
PO Box 190
Fort Duchesne, UT 84026

Dear Mr. Cesspooch:

The Lander Field Office of the Bureau of Land Management (BLM) is revising its general land use plan, the Lander Resource Management Plan (RMP). The RMP serves as the general guidance for all resource and land use management decisions for BLM-administered lands and resources in the Lander Field Office planning area. The previous RMP was completed in 1987 and needs revision to address new management challenges. The upcoming revision will guide the use, protection, and management of natural and cultural resources in the planning area for approximately the next 20 years. See Attachment "A" for the location of the Lander Field Office planning area.

As part of the RMP revision process, the BLM is continuing to contact various tribes who may have traditional ties to or cultural concerns in the planning area[1]. Identification of important tribal sites or areas of Native American cultural concerns can help guide the protection of these valuable resources though the RMP revision process. A recent successful outcome of tribal consultation during the planning process is Cedar Ridge (a large ridgeline containing numerous rock features and sites important to the Eastern Shoshone and other tribes), which was recently protected by a decision in the Casper Field Office RMP revision. A part of Cedar Ridge is located in the Lander Field Office area, and we would like your input on appropriate protection measures for this area as well.

---

[1] In accordance with the National Environmental Policy Act, the Federal Land Policy and Management Act, the National Historic Preservation Act, the American Indian Religious Freedom Act, and Executive Order 13007 on Indian Sacred Sites.

In addition to the RMP revision, the Lander Field Office is also working on two separate Environmental Impact Statements for two full field oil and gas developments proposals. These EIS's cover Devon Energy's Beaver Creek Field (south of Riverton), and the combined EnCana Gun Barrel, Conoco-Phillips Madden, and Noble Energy Iron Horse (GMI) fields, which are located in the Lysite area (see Attachment "B" for the locations of these oil and gas fields). The companies propose to develop approximately 230 new wells in the Beaver Creek project and 1400 new wells in the GMI project. These fields are known to contain sites that traditional elders have already expressed interest in, such as rock cairns and alignments, stone circles, possible burial sites, as well as a part of Cedar Ridge.

To better gather the views of tribes with interest in these areas, we are attempting to schedule field trips for traditional leaders or elders to visit sites or areas of concern for the week of September 8-11, 2009 (Attachment "C"). Please note that participating elders would be paid for mileage, per diem, and consultation fees, but that our funding is limited to one representative per tribe. Other participants are welcome, but funding may not be available.

Please indicate on the attached response form (Attachment "D") whether your tribe would be interested in joining us for these field tours, and which elder you would like to participate in this effort. We will follow-up on this letter with a direct e-mail or phone call to confirm your attendance.

If there are additional traditional, cultural or religious leaders or elders who you believe should be contacted to express their interests or concerns regarding the above projects, please include their names in Attachment "D". We look forward to working with you and your tribal members or authorized representatives who have considerable knowledge of tribal history and concerns.

Thank you for your attention, and if you have any questions, please do not hesitate to contact BLM archeologists Craig Bromley or Karina Bryan at 307-332-8400.

Sincerely,

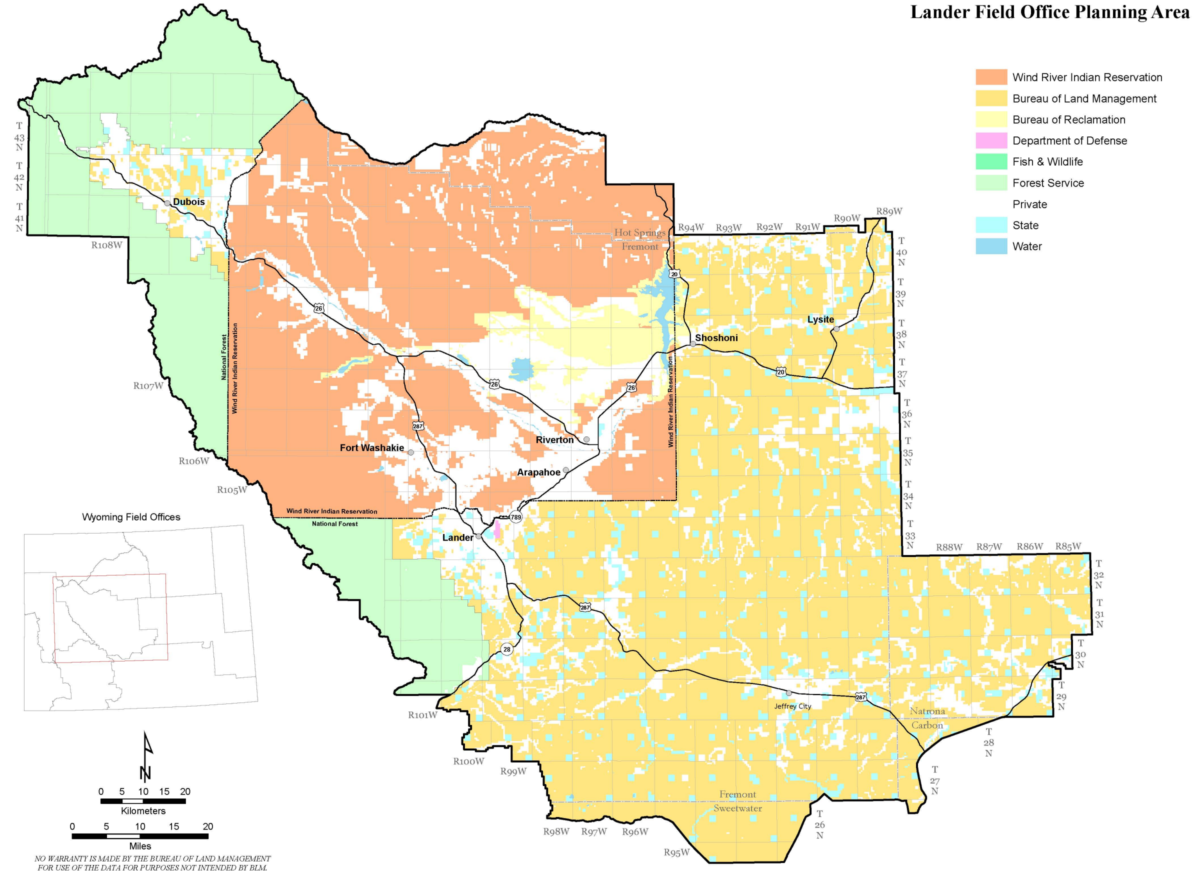
James A. Cagney
Field Manager

4 Attachments

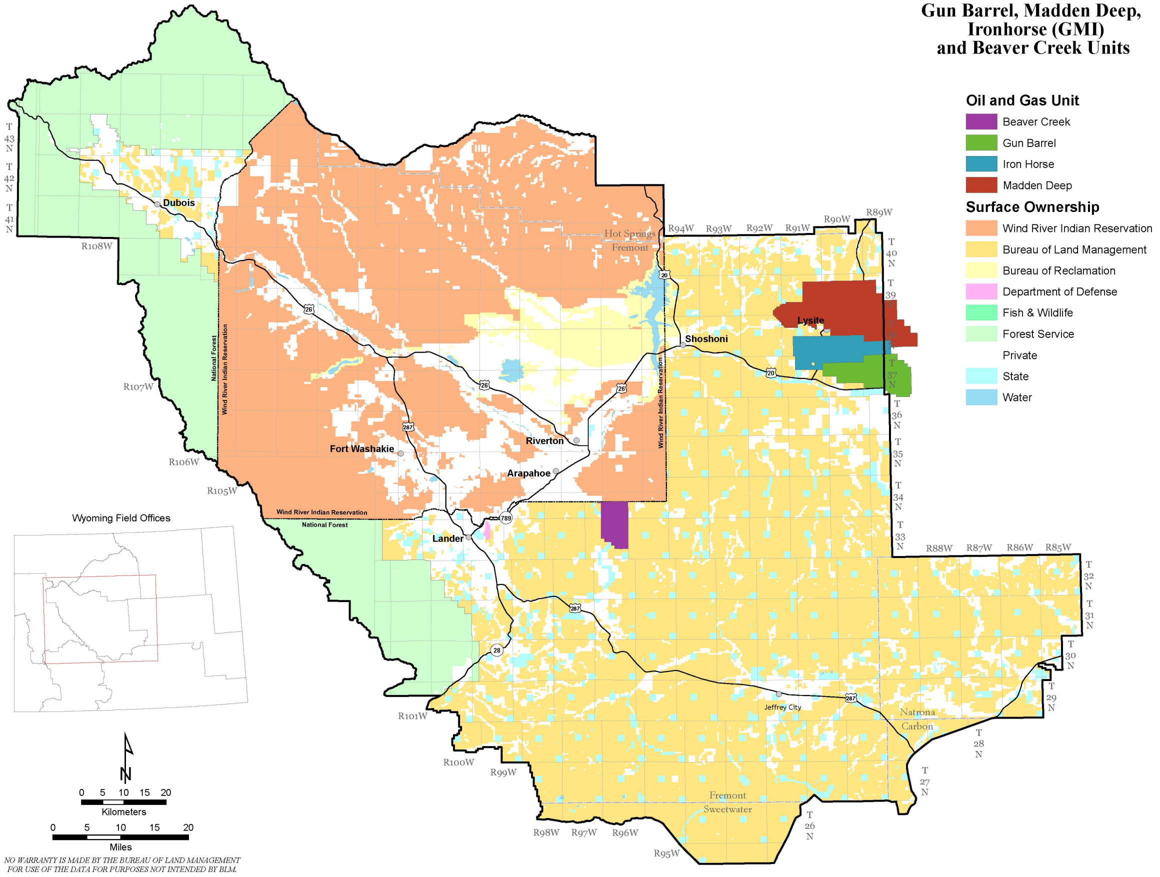
1 – Attachment A: Map of the Lander RMP planning area
2 – Attachment B: Map of the Beaver Creek and GMI projects areas
3 – Attachment C: Field Consultation Schedule
4 – Attachment D: Response Form

CERTIFIED MAIL NO.:7007 1490 0002 1545 0858
RETURN RECEIPT REQUESTED
cc: Betsy Chapoose
PO Box 190
Ft. Duchesne UT 84026

Attachment A
Lander Field Office Planning Area



Attachment B
Gun Barrel, Madden Deep, Ironhorse (GMI) and Beaver Creek Units



CORRESPONDENCE FILE
[ ] CASE FILE
[X] READING FILE

ATTACHMENT C

PROPOSED FIELD CONSULTATION SCHEDULE

Date	Time	Task
September 8, 2009 (Tuesday)	9:00 a.m.	Meet at the Lander BLM office (1335 Main Street, Lander, WY) for orientation and information regarding the RMP and EIS process
	12:30 p.m.	Field trip to the Beaver Creek oil and gas project. If time permits, visit Beaver Rim.
	5:00 p.m.	Back at BLM office
September 9, 2009 (Wednesday)	9:00 a.m.	Meet at the BLM Office; then field trip to the GMI oil and gas project, including Cedar Ridge (sack lunches included). If time permits and elders are agreeable, visit the Castle Gardens Rock Art Site
	5:00 p.m.	Return to the BLM office
September 10, 2009 (Thursday)	9:00 a.m.	Meet at the Lander BLM office; then field trip to sites of interest in other parts of the Lander Field Office RMP planning area (sack lunches included).
	5:00 p.m.	Return to the BLM office
September 11, 2009 (Friday)	9:00 a.m.	Meet at the Lander BLM office; then field trip to sites of interest in other parts of the Lander Field Office RMP planning area (sack lunches included).
	5:00 p.m.	Return to the BLM office

ATTACHMENT D

TRIBAL CONSULTATION RESPONSE FORM REGARDING THE PROPOSED LANDER RMP REVISION AND THE BEAVER CREEK AND GMI EISs

_______ Yes, we are interested in participating in this consultation.

_______ No, we are not interested in participating in this consultation, but information about our concerns is attached. (Any information you provide will be used in a respectful manner, and anything you would like to share with BLM but would prefer not be made public will be kept confidential.)

_______ No, we are not interested in participating in this consultation, and have no further comments.

_______ We would like to receive a copy of the consultation summary notes when they are completed.

Signature: ______________________________ Date: _______________

Name and Title______________________________

Tribal Affiliation: ______________________________

Phone Number and/or Email:______________________________

Additional Contact Names Recommended:______________________________

Please return this form to:

Kristin Yannone
Bureau of Land Management
Lander Field Office
P.O. Box 589
Lander, WY 82520

5.6. List of Preparers

Table 5.2, "List of Preparers" (p. 1283) lists the name, education, title, project role, and years of experience of the individuals involved in the preparation of this document.

Table 5.2. List of Preparers

Name	Education	Title	Role	Years of Experience
Bureau of Land Management				
Kristin Yannone	B.A. History, J.D. Law	Environmental Planner and Coordinator	Project Manager/ Inspector and Team Leader	22
Jim Cagney	B.S. Range/Forest Management	Field Office Manager	Lander Field Office Manager	33
Sydney Schoepke	B.S. Land Resource Management, MS Applied Geographic Information Sciences	GIS Specialist	GIS Data Management	3
Greg Bautz	B.S. Resource Management	Soil Scientist	Soil, Surface Water, Invasive Species	30
Jared Oakleaf	B.A. Geography and Recreation, B.A. Environmental and Natural Resources	Outdoor Recreation Planner	Cave and Karst, Recreation, Travel Management, Wild and Scenic Rivers, Wilderness Study Areas, Areas with Wilderness Characteristics, Visual Resources, Area of Critical Environmental Concern, National Scenic and Historic Trails	10
Scott Fluer	B.S. Range Science	Wild Horse Specialist	Vegetation, Riparian-Wetland Areas, Livestock Grazing, Area of Critical Environmental Concern	24
Tim Kramer	B.S. Rangeland Resources and History, M.S. Rangeland Resources, Crops and Soil Sciences	Natural Resource Specialist, Fire and Fuels	Forestry, Fire and Fuels	14
Sue Oberlie	B.S. Wildlife Management, B.S. Secondary Education	Wildlife Biologist	Fish and Wildlife, Special Status Species, Area of Critical Environmental Concern	26
Curtis Bryan	B.S. Rangeland Ecology and Watershed Management	Natural Resource Specialist	Riparian-wetland areas, Invasive species	8
Chris Krassin	B.S. Soil Science and Rangeland Ecology	Natural Resource Specialist	Reclamation	16

Name	Education	Title	Role	Years of Experience
Bureau of Land Management				
Craig Bromley	B.A. Anthropology	Archeologist	Cultural, Paleontology, National Historic Trails, Area of Critical Environmental Concern	32
Jon Kaminsky	B.A. Geology, M. Sci. Hydrogeology	Assistant Field Manager Minerals	Geology, Solid Minerals	23
Roy Packer	B.S. Forestry and Range and Watershed Management	Rangeland Management Specialist	Livestock Grazing, Vegetation, Wild Horses	36
Leta Rinker	B.S. Business Administration, B.A. Business Management	Realty Specialist	Lands and Realty, including Transportation/ Access and Rights-of-way, Renewable Energy Utility/ Communication Corridors, Land Tenure	25
Rubel Vigil	B.S. Rangeland Management	Assistant Field Manager	Livestock Grazing	25
Stuart Cerovski	B.S. Petroleum Engineering	Resource Adviser	Fluid Minerals	26
Roy Allen	B.S. Chemistry, M.S. and PhD Economics	Social Conditions/ Economic Conditions/ Environmental Justice	Socioeconomics	33
Dean Stillwell	B.S. Geology and M.S. Geology	Geologist	Oil and Gas, Reasonable Foreseeable Development	32
Stan William Davis-Lawrence	B.S. Math/Physics/ Geophysical Engineering, M.S. Geophysical Engineering	Petroleum Engineer	Oil and Gas, Reasonable Foreseeable Development	37
Alfred M. Elser	B.S. Geology, M.S. Geology, and Ph.D. Chemistry with a concentration in geochemistry	Petroleum Geologist	Oil and Gas, Reasonable Foreseeable Development	6
Melissa Hovey	B.S. Civil Engineering, M.S. Environmental Engineering	Air Quality Specialist	Air Resources	14
Consultant				
ICF International – Interdisciplinary Team				
Science Applications International Corporation (SAIC) - Interdisciplinary Team				

Chapter 6. References

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